Af 73
Copy 2

PITTONIA.

A Series of Papers Relating to Botany and Botanists.

BY

EDWARD L. GREENE.

VOLUME IV.

PLATES 9-12.

Washington, D. C.,
1899-1901.

Press of The Law Reporter Company,
Washington, D. C.

CONTENTS.

	PAGE
New Species of Castilleia,	1
A Fascicle of New Violets,	3
New Western Species of Rosa,	10
New Choripetalous Exogens,	14
Notes on Machæranthera,	22
Early Specific Types in Chamæcrista,	25
New Species of Sisyrinchium,	32
New or Noteworthy Species, XXIV,	35
" " " XXV,	68
" " " XXVI,	98
" " " XXVII,	146
" " " XXVIII,	233
" " " XXIX,	318
Neglected Generic Types, I,	45
" " " II,	207
Two New Gerardias,	51
A Decade of New Gutierrezias,	53
Some Western Species of Xanthium,	58
Four New Violets,	64
Segregates of Caltha Leptosepala,	73
New Species of Antennaria,	81
West American Asperifoliæ, IV,	86
Necker's Genera of Ferns, I,	103
A Fascicle of Senecios,	108
A Decade of New Pomaceæ,	127
A Fascicle of New Papilionaceæ,	132
Notes on Violets,	139
Some New or Critical Ranunculi,	142
A Fascicle of New Arnicas,	159
Some Rudbeckia Segregates,	174

PAGE

A DECADE OF NEW GENTIANACEÆ, - - - - - - - 180
STUDIES IN THE CRUCIFERÆ, III, - - - - - - 187
1. Certain Species of Arabis, - - - - - 187
2. Miscellaneous New Species, - - - - - 198
3. Type of the Genus Draba, - - - - - - 203
4. A Proposed New Genus Abdra, - - - - 205
SOME ROCKY MOUNTAIN ASTERS, - - - - - - 212
CORRECTIONS IN NOMENCLATURE, III, - - - - - 224
" " " IV, - - - - - - 307
TARAXACUM IN NORTH AMERICA, - - - - - - 227
STUDIES IN THE COMPOSITÆ, VIII, - - - - - - 242
1. Type of the Bidentideæ, - - - - - 242
2. Sketch of the History of Bidens, - - - - 243
3. Identity of Bidens Frondosa, Linn., - - - 246
4. Sketch of the History of Bidens Cernua, Linn., - 251
5. American Analogues of Bidens Cernua, Linn., - 252
6. Segregates of Bidens Chrysanthemoides, Michx., - 262
7. Generic Rank for Bidens Beckii, Torr., - - 270
8. Some New Eupatoriaceæ, - - - - - - 272
9. Certain Species of Antennaria, - - - - 280
SOME NEGLECTED VIOLETS, - - - - - - - - 285
NEW SPECIES OF CERASTIUM, - - - - - - - 297
FIVE NEW SPECIES OF RUMEX, - - - - - - - - 304
STUDIES IN THE CRUCIFERÆ, IV, - - - - - - - 307
1. New Species of Lesquerella, - - - - - 307
2. Miscellaneous New Species, - - - - - 311
NEW SPECIES OF LACINIARIA, - - - - - - - 315
NEW SPECIES OF MONARDELLA, - - - - - - - 321

C
4/26/04

QK1
.P49
1899-1901
v.4

Vol. IV. Part 20.

PITTONIA.

A SERIES OF BOTANICAL PAPERS

BY

EDWARD L. GREENE,

Professor of Botany in the Catholic University of America,

WASHINGTON, D. C.

JANUARY–APRIL, 1899.

CONTENTS.

	PAGE
NEW SPECIES OF CASTILLEIA,	1
A FASCICLE OF NEW VIOLETS,	3
NEW WESTERN SPECIES OF ROSA,	10
NEW CHORIPETALOUS EXOGENS,	14
NOTES ON MACHÆRANTHERA,	22
EARLY SPECIFIC TYPES IN CHAMÆCRISTA,	25
NEW SPECIES OF SISYRINCHIUM,	32
NEW OR NOTEWORTHY SPECIES, XXIV,	35
NEGLECTED GENERIC TYPES I,	45
TWO NEW GERARDIAS, (Plates, ix and x).	51

Price, Fifty Cents

PAYOT, UPHAM & CO., *San Francisco*: WILLIAM WESLEY & SON, *London.*

New Species of Castilleia.

C. Haydeni. *C. pallida*, var. *Haydeni*, Gray, Syn. Fl. ii 297. The characters for this, as indicated by Gray, are altogether of specific value; but to those are others to be noted, over and above those of the low stature, cleft foliage and laciniate bracts. The spike, as compared with that of *C. pallida*, is long and lax. The color of them is also not "bright crimson," but a soft rose-red, or else paler and with an admixture of lilac. It is a common alpine species of southern Colorado.

C. confusa. Perennial, the tufted stems about 1½ feet high, green and glabrous below, more or less villous above, the inflorescence strongly villous with long slightly deflexed somewhat viscid but not glandular hairs: lower leaves all lanceolate, acuminate, entire, 2 or 3 inches long; those under the inflorescence broader and with a pair of narrow falcately divergent lobes; bracts of the spike still shorter and broader, mainly scarlet, and with two pairs of lobes: calyx with four subequal lanceolate acute lobes: corolla well exserted, the galea notably villous along the back, twice the length of the lip, the prominent teeth of which are incurved.

A somewhat subalpine rather large species of the more southerly or southwesterly Colorado Rocky Mountains, and those of adjacent New Mexico. It has been confused with *C. miniata*, to which it is, indeed, related; but it lacks the tall strict habit of that species, and its pubescence is of quite another character, that of *C. miniata* being sparse, short, and mostly gland-tipped, that of the back of the galea notably so. And the calyx-lobes in that species are oblong and obtuse. Bentham so describes them; and Gray's account of these

Pittonia, Vol. IV. Pages 1-8. 5 Jan., 1899.

appears to have been drawn from the plant here defined as new, rather than from the northwestern and true *C. miniata*.

C. REMOTA. Perennial, the stems erect, 1 to 2 feet high, rather sparsely leafy and the flowers very loosely spicate; the margins of leaves and bracts sparingly hirsute-ciliate and the other short pubescence scanty: leaves rather broad, of oblong outline, somewhat digitately cleft at and near the summit, the body of the leaf quite entire: flowers an inch apart in the spike, or more, their bracts almost like the leaves in cut, either the tips of their lobes or the whole upper portion of the bract scarlet: calyx only slightly cleft into 4 subequal obovate-oblong obtuse lobes, these scarlet-tipped: comparatively short corolla exserted from the calyx by about half the length of the galea.

Goldstream, Vancouver Island, 20 May, 1887, collected by John Macoun. A very distinct species, of the group to which *C. angustifolia* belongs.

C. SUBINCLUSA. Perennial, the tufted erect rather slender very rigid and brittle stems about a yard high, these and the long narrowly linear entire leaves cinereous with a fine short very rough pubescence: spike at length 6 or 8 inches long and somewhat lax: bracts very narrow, far surpassing the flowers, narrowed in the middle, the acute scarlet tip slightly dilated: calyx nearly 2 inches long, spathaceous by a very deep anterior fissure, the long upper lip fully as long as the galea of the corolla and deeply cut into four very narrow and slenderly acuminate lobes.

Foothills of the Sierra Nevada in Amador and Calaveras counties, California, Geo. Hansen, July, 1896 (numbers 1730 and 1800). A very distinct and remarkable species allied to *C. linariæfolia* and *C. candens;* the flowers greatly elongated, and corolla almost enclosed by the mainly scarlet calyx.

A Fascicle of New Violets.

V. FALCATA. Plants solitary, the rootstock about 2 inches long, perpendicular, rather conspicuously nodose, the roots not numerous: leaves mostly 2 only, their petioles very strictly erect, the whole leaf a foot long or more, sparsely pubescent, the long petioles retrorsely hirsutulous; blade of broad-deltoid outline, primarily deeply cleft or even divided into 3 segments, of which the middle one is usually simple, lanceolate or rhombic-lanceolate, remotely toothed above the middle, or even throughout, the lateral divisions mostly cut into two or more lobes or subdivisions, of which the outer are more or less notably lunate or falcate, the leaf as a whole from 4 to 9 inches broad and much broader than long: petaliferous flowers not known, the æstival and apetalous ones subterranean, their delicate blanched peduncles 3 to 6 inches long, horizontal, bearing round-ovoid capsules.

In oak woods, near Cobden, Illinois, 15 June, 1898. Remarkable among the acaulescent violets for its large size, and the distinctly lunate or falcate divisions of its apparently compound leaves. In one of the specimens there are three withered aerial capsules, evidently the product of the ordinary early petaliferous flowers.

V. CONJUGENS. Plants tufted, often densely so, the long petioles and peduncles erect, the latter commonly 8 or 10 inches high and well exceeding the leaves; herbage slightly succulent, deep-green, appearing glabrous, but the upper face of the leaves sparsely short-pubescent along the veins and veinlets: blade of leaf comparatively small, the lowest less than an inch long and broadly cordate-ovate, plane, the later ones $1\frac{1}{2}$ inches long and from cordate to cordate-subsagittate and somewhat cucullate, all with broad sinus and the earlier somewhat decurrent on the petiole: corollas

large, blue, more than an inch in diameter, the lamina of the petals broadly and obtusely obovate, the claw and the base of the blade white and densely white-hairy, the hairs flattened: sepals lanceolate, acutish, wholly glabrous: apetalous flowers not seen, but doubtless aerial.

This is one of the most distinct violets of Maryland, though doubtless uncommon, and I am confident it has never been described. It inhabits grassy uplands along the borders of forests looking northward, and holds a place almost exactly intermediate between such widely different species as *V. cucullata* and *V. emarginata*, exhibiting almost the foliage of the latter, and flowers as much resembling those of the former, though the petals are broader, of a deeper blue, and the plant decidedly more showy when in petaliferous flower. Though the mature plant is multicipitous, the younger ones, at first flowering from seed, are solitary; and in this condition the species would be very apt to pass for *V. emarginata* with the inexpert. My specimens are from Anne Arundel Co., Maryland; but I have seen it in one other station, and that along the railway towards Harper's Ferry. Where it occurs it is rather plentiful; and, as it is associated with no other violet whatsoever, it can not be of hybrid origin.

V. SUBSINUATA. *V. emarginata*, var. *subsinuata*, Greene, Pitt. iii. 313. A further study of this beautiful violet of the mountains of eastern Tennessee reveals characteristics which declare it quite distinct from *V. emarginata.* Its leaves are of a firmer texture, less succulent, and on notably and constantly shorter petioles; and they are pubescent, after the manner of what is supposed to be *V. palmata;* to which, indeed, the plant is more nearly related than to *V. emarginata;* for its apetalous summer flowers are horizontal and at least partially buried; a condition of things not occurring in any of the group to which *V. emarginata* belongs. The peduncles of the petaliferous flowers are very slender, ascending rather than erect, and the petals, always of a lighter blue, are broad and obtuse, never emarginate.

V. Mistassinica. Allied to *V. blanda*, but the rootstock elongated, stout, short-jointed, clothed with the persistent bases of the petioles of former years: plant at flowering time 2 to 4 inches high, the peduncles and petioles erect, of somewhat equal length; herbage of delicate texture, light-green and glabrous: leaves round-reniform to orbicular, obtuse but with a short salient cusp at the apex, the margin rather notably dentate or crenate-toothed: sepals oblong or oblong-lanceolate, obtuse: corolla ½ inch in diameter, the petals all broad and obtuse and glabrous, the lowest (or keel) not only purple-veined but the purple color diffused over the whole petal, the others pure white.

This rather strongly marked white violet is known to me only in herbarium specimens from northeastern British America. The type sheets are three, all belonging to the herbarium of the Canadian Geological Survey, and numbered as follows: 2,353, from damp mossy woods about Lake Mistassini, collected in July, 1885, by J. M. Macoun, the specimens only in full flower at that date: also n. 4,342 from West Branch, Hamilton River, Labrador, A. P. Low, 20 June, 1894, these in early flower, the leaves small: and n. 16,286, from along Richmond Gulf, east shore of Hudson's Bay, Mr. Spreadborough, 30 June, 1896; these specimens large and rank, barely in good flowering condition. From all its allies *V. blanda, renifolia* and *amœna*, this is readily distinguished by its stout scaly-looking and elongated rootstock, and by its notably toothed foliage, the leaves in all the others being crenate, the proper teeth never salient but on the contrary almost obsolete. The cuspidately apiculate character of the leaf is also quite constant; and so is the deep color of the lower petal. The species is probably not stoloniferous.

V. Watsonii. Allied to *V. blanda* but much larger, similarly light-green as to herbage, and somewhat succulent; leaves relatively smaller, on elongated and stoutish

petioles, of cordate-ovate outline, distinctly and somewhat closely crenate, the upper surface with scattered and somewhat appressed short hairs, the plant otherwise glabrous: peduncles long, surpassing the leaves, bracteolate near the middle: sepals lance-linear, 4 lines long, with narrow scarious margins and an acutish but callous-tipped apex: petals apparently pure white, spatulate-oblong, more than ½ inch long (the expanded corolla more than an inch in diameter), three of them bearded below with strongly clavate white hairs.

A very noteworthy new white violet, found in a bog meadow some miles from Charlottetown, Prince Edward Island, by Mr. Laurence W. Watson, in June, 1898. Though doubtless of the *V. blanda* group, it is remarkable for the great dimensions of the corolla, and the robustness of the general habit, the leaves, however, being much smaller in proportion to the whole plant. The rhizome, as far as the specimens show it, is much shorter and stouter than in any of the other relatives of *V. blanda*. We are not informed as to whether the flowers are, as in our other white violets, fragrant.

V. RETUSA. Acaulescent, low, stout and subsucculent, glabrous throughout except the petals: lowest leaves subreniform and small, abruptly acutish, the others successively broadly cordate-ovate and deltoid-ovate, with an abrupt short acumination, all with broad open sinus and more or less distinctly tapering to the short petiole, the margin crenate-serrate: peduncles stout, about equalling the leaves, bibracteolate above the middle, the bracteoles broad, triangular-subulate: sepals lanceolate, nerveless, scarious-margined: petals narrowly spatulate or oblong-spatulate, truncate or retuse at apex, apparently blue, three of them somewhat bearded at base.

Plains of northern Colorado, toward the foothills; the best specimens from Carl F. Baker, collected at Fort Collins,

2 May, 1896, and named by me *V. cognata* at the time; but that species, besides being slender and with slender rootstock, has foliage of rounded outline. In the new one the leaves are trigonous rather than rounded, the rootstock stout and erect, and the whole plant of a very different aspect.

V. CYCLOPHYLLA. Root unknown, the tufted leaves and flowers terminating a horizontal scaly caudex; the whole plant glabrous: leaves orbicular, about an inch in diameter, cordate at base with nearly or quite closed sinus, crenate, on petioles of an inch in length or a little more: stout peduncles twice the length of the leaves, bibracteolate far below the middle: sepals lanceolate, thin, nerveless, scarious-margined; corolla blue, nearly $\frac{3}{4}$ inch broad, somewhat orbicular, all the petals extremely broad and rounded (round-obovate), marked by dark violet veins toward the base and all wholly glabrous.

Collected at Yellow Head Pass in the Rocky Mountains of British Columbia, 13 July, 1898, by Mr. W. Spreadborough, and communicated by Mr. Macoun; being n. 19,298 of the Geol. Survey Herbarium.

The following violets have hitherto been recognized by us under names that are untenable:

V. ALSOPHILA. *V. amœna*, Le Conte, Lyc. N. Y. ii. 144, the name precluded by the *V. amœna* of Symons, Syn. Pl. Brit. 198 (1798). The species is seen to be one of the best when one has given due attention to the floral characters. Not only is *V. alsophila* a woodland plant, whereas *V. blanda* is of boggy meadows, but its petals are twice as large, and remarkably narrow, the two uppermost being quite ligulate, strongly deflected, and twisted almost like the sepals of some orchids. On my first beholding, three years since, the living

flowering plants of what we were calling *V. amœna*, this remarkably contorted corolla impressed me at once as exceedingly characteristic; and, now that I possess Le Conte's unpublished plate, I perceive just this floral character to have been fully appreciated, and well brought out by him.

It has been supposed by some, particularly by Asa Gray, that Pursh's *V. clandestina* was the same as Le Conte's *V. amœna*; but Le Conte, who knew Pursh and his violets very well, knew better. I am in possession of evidence quite conclusive that Pursh's *V. clandestina* is *V. rotundifolia;* and even Pursh said plainly enough that he had such a suspicion himself.

Although the *V. blanda* var. *palustriformis* of Gray is by that author made to include our *V. alsophila*, nevertheless the type of that variety is a rather high northern plant with very broad and obtuse leaves, quite resembling those of the European *V. palustris*, to which latter *V. alsophila* makes no manner of approach.

V. SEMPERVIRENS. *V. sarmentosa*, Dougl. in Hook. Fl. i. 80; the name preoccupied in the *V. sarmentosa* of Bieberstein, Fl. Tauro-Caucas. i. 172 (1808). The plant of Douglas is not only one of the most beautiful of American yellow-flowered violets, it appears to be our only species whose leaves are coriaceous and evergreen. This character has never before been clearly indicated; but it has been familiarly known to me for twenty years. I stated the fact, but perhaps indistinctly, in the *Bay-Region Manual.*

V. RAFINESQUII. *V. bicolor*, Pursh, Fl. i. 175 (1814), and Nutt. Gen. 151 (1818), not of Gilibert (1781). *V. arvensis*, Muhl. Cat. 25 (1818), also Ell. Sk. 302, not of Murray (1770). *V. tenella*, Raf. Am. M. Mag. iv. 191 (1819), probably also of Muhl. l. c. 26 (1818), but not of Poiret (1810).

This is our only American representative of the Old World pansy group of violets; and it is not strange that the earlier generations of American botanists referred it to one or another of the segregates, in their day recently made, of the *V. tricolor* of Linnæus. Rafinesque was probably the first to name our plant as a species distinct from all European violets. But of this we cannot be positive; for his *V. tenella* of 1808 is a name only, and cannot now be brought into use for any species.

It is quite likely that Muhlenberg—who seems to have had for his *V. arvensis* a well-matured plant of the present species, and to have founded his *V. tenella* on the early vernal state of it—adopted the latter name from Rafinesque. Yet this author's *V. tenella* is also a *nomen nudum*.

The first presentation of the plant to the public under a new name and with a cited means of identification, was made by Rafinesque, as above indicated; but inasmuch as the name *tenella* had then been in use for nine or ten years to designate a Syrian violet, I here dedicate the American species to him who was first to really publish it as new.

V. VICINALIS. *V. insignis*, Pollard in Bot. Gaz. xxvi. 334. An Austrian *V. insignis*, published by Richter in 1888, precludes the acceptance of Mr. Pollard's appellation for the plant of the Southern U. S. The figure on page 335 of the *Gazette* represents the type of the species; but a considerable part of the herbarium material which Mr. Pollard refers to it, I have long taken to be very fair *V. septemloba;* and the name *vicinalis* is doubly appropriate to a violet which is not only manifestly related to *V. septemloba*, but is of the same general habitat.

New Western Species of Rosa.

R. melina. Stout and much branched, 3 or 4 feet high, the stem and branches red, glabrous, glaucescent, sparingly armed with short prickles, some stout and longer, others slender and smaller, but all strongly recurved: stipules finely glandular-serrulate, with also some subsessile glands extending to the rachis of the leaf, but leaflets glabrous and glandless, these about 7, ovate or oval, acute or obtuse simply and sharply serrate: peduncles of the solitary flowers short and stout, woody and not in the least curved or bent in age by the weight of the very large fruit; this broadly somewhat inverse-pyriform, smooth and glabrous, nearly 1½ inches in diameter: sepals smooth and glabrous except on the margin, this closely beset with short-stipitate glands, the foliaceous terminal part commonly nearly as large as the basal portion and perfectly glabrous, either simple or with a few large teeth or lobes.

Apparently common at middle elevations in the mountains of Southern Colorado; the best specimens (in fruit only) collected by myself at Cerro Summit above Cimarron, 30 Aug., 1896; but the species has a northwesterly extension apparently to Montana, and has passed for *R. Nutkana* with some; though it is extremely different from that by its small glabrous foliage, short and hooked prickles, short woody peduncles never shrinking and curving in fruit; and the sepals are neither long-attenuate nor gland-bearing on the back as in those Northwest Coast roses which form the *R. Nutkana* aggregate.

R. Macounii. Low shrub of compact growth, the growing branches and short flowering branchlets densely leafy, the older armed with numerous prickles of various sizes, all stoutish and rather deflexed than recurved: leaves wholly glandless, glabrous except a slight soft pubescence on the

stipules, rachis and lower face of leaflets; stipules short, ample for the size of the leaves, and plane, obtusish or short-pointed; leaflets mostly 9 or 11, somewhat cuneate-obovate, obtuse, sharply serrate from the middle, otherwise entire: flowers solitary and short-peduncled, small, rather pale; sepals broad, woolly-ciliate, bearing very short and inconspicuous foliaceous tips: fruits large for the plant, depressed-globose, of a light red (between scarlet and orange).

This rather common rose of the middle and northern Rocky Mountains has often been taken for a stunted and subalpine *R. blanda*, though it is more commonly labelled in the herbaria as *R. Woodsii;* but to this latter it bears no intimate relationship at all; for that is a shrub with perfectly straight prickles, glandular-edged very narrow and acute stipules, ovate fruit and shining foliage.

My best herbarium specimens are those collected by Mr. John Macoun in Assiniboia (Canad. Surv. numbers 10532 and 10533), and by myself near Cheyenne, Wyoming. It belongs to the region of dry elevated plains, and is subalpine as to elevation.

R. MANCA. Dwarf subalpine shrub, sometimes a foot high or more, rather freely branching, the glabrous and smooth red stem and branches armed with few and stoutish compressed and very strongly recurved prickles: leaves small, the leaflets about 7, from somewhat obovate to elliptic, thin, sharply but not deeply serrate, the serratures callous-tipped and the larger with one secondary tooth, all smooth and glabrous on both faces; stipules extremely narrow, glandular, the long and narrow though prominent auricles more herbaceous: flowers solitary at the ends of short leafy branchlets: receptacle and back of sepals glabrous and glaucescent; sepals finely woolly-margined and with notable scattered sessile black glands among the wool, usually also appendaged on one side by a pair of long spreading linear lobes, the foliaceous tips narrowly oblong, entire, glabrous and glandless: corollas small: fruit not seen.

Collected by Messrs. Baker, Earle and Tracy, on dry hillsides at about 10,000 feet altitude in West Mancos Cañon, southern Colorado, July, 1898, and distributed for *R. Arkansana.* The name assigned this excellent new rose is taken from the geographical name Mancos, which is Spanish and also Latin for " the cripples."

R. SUFFULTA. Stems low, simple, corymbosely floriferous at the summit, the bark green and glaucescent, rather densely armed with comparatively short straight spreading or ascending prickles: leaflets about 9, obovate, acute, serrate, finely pubescent on both faces but most so beneath, the rachis short-prickly and with a few short-stalked glands: stipules well developed, sparsely glandular on the margin, their auricles with entire inner margin, the outer strongly and evenly glandular-serrate: receptacle smooth and glabrous; sepals with woolly-ciliate margins, the back bearing scattered subsessile glands, their foliaceous tips small and entire: fruit not seen.

Of this southern Rocky Mountain rose I have seen but one specimen, and that was communicated to me some years since by the late Dr. Geo. Vasey, from the meadows of the Rio Grande at Las Vegas, New Mexico. It was labelled "*R. blanda* var. *setigera*, Crepin," which is now taken by Crepin for *R. Arkansana.*

The name *R. suffulta* is suggested by a circumstance which I have not mentioned in my diagnosis, because I fear it may be accidental or occasional; though it may possibly prove to be a real character. Between the two auricles of the stipules there arises a leaflet, or a pair of them, well developed and conspicuous, though of only one-fifth or one-fourth the size of the proper leaflets; and these are not like the ordinary leaflets, in that they hold an upright rather than a pinnate-spreading posture. They are parallel to the lobes or auricles of the stipule, not at right angles with them as the true leaflets are.

R. PRATINCOLA. Almost herbaceous, and never more than suffrutescent, 1 or 2 feet high, usually flowering terminally and corymbosely from upright shoots of the season; bark of the stem green and glaucescent, the prickles dark purplish, all rather slender and weak, but some larger and less slender than others, all straight, spreading or slightly deflexed: leaves very ample for the plant; leaflets 7 to 11, obovate and oblong-obovate, sharply serrate, somewhat cuspidately acute, pubescent on both faces when young, the upper face glabrate in age; stipules very narrow and entire, soft-pubescent, but neither glandular nor prickly, the rachis often setose-prickly; receptacle smooth and glabrous, the sepals very woolly within and also marginally, the tips villous on both sides, the back of the basal part glandular-hispid: achenes nearly smooth, but more or less hirsute on certain of the angles and about the base or summit.

I thus designate unhesitatingly as a new species one of the commonest of North American roses, and one most abundantly inhabiting a very extensive range in the United States and Canada; a denizen of the prairie regions of the West and Northwest, from Illinois and Missouri to the Dakotas and Manitoba. It has passed for *R. Arkansana*, and to that extent that probably almost all the so-called *R. Arkansana* of the herbaria of the country is of this species. It is found in eastern Kansas and Nebraska, but does not occur in Colorado, or anywhere very near its borders, in so far as we can ascertain. It is the peculiar rose of the rich grassy prairies of the upper Mississippi Valley; and, though passing usually for *R. Arkansana*, has been distributed by Sandberg, from Minnesota, as *R. humilis*. It is, of course, a part of *R. blanda* of the earlier American authors, and of local botanists residing in the prairie regions.

Probably no botanist knowing, as I know, both the Illinois and Wisconsin prairies, and the valley of the Arkansas in Colorado, could be brought to entertain the notion that any species of rose could be common to the two. The latter

is an arid and subsaline half-desert country, a region of cactaceous and salicorniaceous plants, probably about as different from the region of *Rosa pratincola* as Arabia is from England; a consideration which does not seem to have entered the minds of our American rhodologists—if we have any—much less those of the European students of the genus.

Rosa Arkansana has not, I think, been collected a second time; and as I spent many a week in arduous collecting about Cañon City, in different years between 1873 and 1896, without having seen original *R. Arkansana*, I entertain a suspicion that it may have been founded on some corymbose-flowering precocious shoot from the root of the so-called *V. blanda* of that region, or perhaps of *R. Fendleri*. But, apart from the antecedent improbability of this our eastern prairie species being also an inhabitant of a cactus desert, the western and xerophilous rose, the real *R. Arkansana*, is glabrous, while ours is pubescent; it has stipules both glandular and prickly, while ours has them softly pubescent only; it has sepals reflexed in fruit, while in ours these are erect.

New Choripetalous Exogens.

Aquilegia elegantula. Erect, slender, mostly less than a foot high, glabrous except as to the inflorescence, the peduncles and exterior of the flowers hirtellous-pubescent; the long-petioled and almost exclusively radical leaves glaucous beneath: flowers mostly solitary, terminating the merely bracted scapiform stems: flowers small, about 1 inch long, the light-green sepals and light-yellow limb of the petals erect; spurs straight, longer than the sepals, rather widely inflated above and this part of the flower light-scarlet: filaments short; styles elongated and exserted.

Southern Colorado, in Slide Rock Cañon, and on the flanks

of Mt. Hesperus in spruce woods; collected by Messrs. Baker, Earle and Tracy, 30 June, 1898 (n. 237).

Ranunculus ocreatus. Stems only 3 or 4 inches high, stoutish and succulent, solitary, from rather elongated and slender ascending rootstocks having few and elongated fibrous roots; the herbage quite glabrous: earliest foliage represented by one or more ample scarious stipular sheaths; the lowest proper leaves only 1 or 2, with short scarious-stipuled petiole, and blade of suborbicular outline 3–5-parted, their divisions 3-lobed; cauline leaves similar but subsessile, with short but broad hyaline and sparsely ciliate stipules: flower solitary, short-peduncled; sepals large and spreading, villous-hirsute externally; the inconspicuous petals 5, barely equalling the sepals: filaments short; head of pistils elongated: achenes unknown.

Collected by Baker, Earle and Tracy on Mt. Hesperus, Colorado, 2 July, 1898 (n. 912). Manifestly related to *R. Eschscholtzii*, yet of very different habit; remarkable for the great development of scarious stipules. The underground growth very characteristic. Possibly some specimens of this species in the herbarium of Dr. Gray may have given rise to the statement made in the *Synoptical Flora* about a "commonly oblique caudex or short horizontal rootstock" in *R. Eschscholtzii*. But the genuine *R. Eschscholtzii* I venture to say—and I speak from large experience of the plant in many and widely sundered fields—has always clustered stems arising from a compact tuft of fibres, showing no trace of rootstock or caudex.

Ranunculus Earlei. Related to *R. Bongardi*, similarly perennial and with slender fibrous roots, the stoutish and nearly glabrous stem 1 to 2 feet high and strictly erect; petioles villous, and lower face of the leaves sparingly so, or when young somewhat silky; blade of the leaves 3–5-parted, the segments of obovate general outline and cut into about 3 oblong or lanceolate lobes: pedunculiform branches few

and very erect: sepals villous, reflexed: corolla 4 to 6 lines broad, the 5 petals oblong-obovate, obtuse, commonly persistent until the maturing of the achenes, these forming a subglobose rather large head; body of the achene compressed, but not thin, marginless, the sides strongly punctate under a lens, but smooth and glabrous, the beak stout and rather long, but with a more slender closely recurved tip.

Along the Mancos River and other streams, June 22 and 28, Baker, Earle and Tracy (38, 39, 187). Distributed as *R. acriformis*, to which it bears nothing like a near affinity. It is, as I have said, most related to *R. Bongardi*, Greene, but differs essentially by its large and more or less persistent petals.

Cleome inornata. Annual, a foot high or more, erect, rather widely branching above the middle; lower face of leaflets, and also the inflorescence, sparsely hairy, the whole plant otherwise glabrous: leaflets 3, rather broadly lanceolate, acute, entire, less than an inch long, racemes short and dense: calyx-teeth broadly triangular and cuspidately acuminate: petals white or faintly purplish: stamens very short, not exserted, the filaments not longer than the linear anthers; stipe of ovary longer than the rather short erect somewhat incurved ovary; the latter tipped with a very distinct slender and incurved style.

Near Grand Junction, Colorado, 26 Aug., 1896. Related to *C. serrulata* (otherwise known as *C. integrifolia*) somewhat closely, this notwithstanding its small size, and almost inconspicuous white flowers. The showiness of the flowers in most members of this genus is owing to the greatly elongated and distinctly colored filaments which always surpass the corollas; but here the stamens are short and almost included within the corolla. The prominent inflexed style is another notable character.

DRABA PETROPHILA. Stems several, rigidly erect from a slightly decumbent base, about 4 inches high, these and the long basal leaves arising from a stout and simple perpendicular crown or rootstock densely clothed with the persistent bases of the leaves of former years: basal leaves oblanceolate, obtusish, entire 1½ inches long, stellate-pubescent and hirsute-ciliate; the cauline similar as to pubescence, though less ciliate, but rather numerous, ovate-oblong, sparingly toothed, sessile by a broad base and erect: racemes short and subcorymbose; corollas large, yellow; calyx sparingly hirsute: pods elliptic or elliptic-lanceolate, glabrous, strongly twisted, beaked by a slender style ½ line long or more.

Ledges of the Santa Rita Mountains, southern Arizona; collected by C. G. Pringle, 1884, and distributed as *D. streptocarpa;* but greatly at variance with that in its stout scaly caudex, upright basal leaves, and obtuse erect cauline ones, not to speak of that stellate pubescence which completely debars its admission as a form of that species.

DRABA HELLERIANA. *D. stylosa*, Heller in herb., not of Dulac (1867), nor Turcz. (1854), nor *D. aurea*, var. *stylosa*, Gray. Stoutish freely branching and leafy biennial (or perhaps sometimes perennial) 1½ feet high; herbage rather thinly clothed with short forked or somewhat stellate hairs, the stem with some longer and hirsute ones forked above the middle: cauline leaves ovate-oblong, entire or few-toothed, somewhat narrowed to the sessile base: racemes numerous and short, subsessile: sepals yellow, hirsutulous with forked hairs; petals golden-yellow: pods much longer than the pedicels, narrow and twisted, acute, tipped with a long stoutish style, marginally hispid-ciliolate, the hairs either simple or forked.

In cañons among the foothills of New Mexican mountains at elevations of 7,000 to 8,000 feet, Heller (n. 3669), and Wooton (275). Mr. Heller's statement, printed on his labels

'Authentic specimen, from type locality," is mere bombast. Fendler collected no such plant as this; and Mr. Heller did not find the subalpine Fendlerian type on which Gray founded his *D. aurea* var. *stylosa.*

DRABA NEO-MEXICANA. *Draba aurea*, var. *stylosa*, Gray, but not *D. stylosa* of Heller. Perennial, the few slender sparsely leafy flowering stems 4 to 6 inches high: lowest leaves spreading and loosely rosulate, oblanceolate, entire, acutish, densely stellate-pubescent beneath, sparsely so above, destitute of simple hairs; cauline leaves similar as to pubescence, but of rather broadly lanceolate outline: calyx stellate-pubescent: pods elliptical, scarcely twisted, glabrous, acute, tipped with a long style.

A subalpine species, of the mountains back of Santa Fé, New Mexico; this description drawn from Fendler's n. 43 as found in the U. S. Herbarium. I know no other specimens agreeing with them; though I doubt not that more or less of the so-called *D. aurea* of the Rocky Mountains may belong here. I have seen no North American specimens which could rationally be referred to *D. aurea* after being compared with the Greenland type of the species.

DRABA PINETORUM. A tall and rank very leafy perennial, commonly almost 1½ feet high: basal leaves from spatulate-obovate to oblanceolate, denticulate, seldom an inch long, the cauline larger, often 1½ inches long, lanceolate or oblong-lanceolate, evenly denticulate or somewhat serrately toothed, all stellate-scabrous on both faces, the stem with some short simple hairs: racemes 1 to 3, elongated but subsessile; sepals nearly glabrous, the hairs much scattered and mostly simple: pods scarcely 3 lines long, on pedicels of about 6 lines, oblong or elliptic, contorted, tipped with a long style, the valves notably hispidulous with simple hairs.

In pine woods along the summit of the Pinos Altos Mountains, southern New Mexico, 16 Sept., 1880; collected

by the present writer, and distributed as a variety of *D. streptocarpa*, according to what was then Dr. Gray's opinion regarding it.

Draba spectabilis. Perennial, the stems numerous, erect, 6 to 12 inches high, equably and rather copiously leafy to the middle, the upper one-half occupied by the long and showy short-peduncled raceme: basal leaves few, narrowly obovate, short-petiolate, an inch long or more; the cauline oblong-obovate, sharply and even sometimes deeply and incisely serrate-toothed; all the foliage thinnish as to texture and green, the lower face sparsely clothed with bifid and closely appressed hairs, or some of the hairs showing a third and short branch, upper face more sparingly roughened with binate or ternate shorter and merely ascending (not appressed) hairs: sepals from almost glabrous to sparsely hirsute with mostly simple hairs: petals very large, golden-yellow: pods $\frac{1}{3}$ to $\frac{1}{2}$ inch long, oblong, obtuse or acutish, glabrate or hirtellous, tipped with a prominent style, their ascending or spreading pedicels $\frac{1}{2}$ to $\frac{3}{4}$ inch long, hirsute in a line beneath, otherwise glabrous.

Plentiful at from about 10,000 to 11,000 feet altitude in the La Plata Mountains of southern Colorado; collected in 1898, by Baker, Earle and Tracy, and distributed by them partly for *D. aurea* and partly for *D. stylosa*, Heller; but the plant has excellent specific characters of its own, and is doubtless the most showy known *Draba*; in this respect easily rivalling the scapose *D. Mogollonica*, Greene.

Draba luteola. Perennial, 6 to 10 inches high, pale and cinereously stellate-pubescent throughout, with only a scanty and dimly perceptible villous pubescence of simple hairs mixed with the stellate on the stem: leaves all ovate-lanceolate, acutish, entire or serrate-toothed, those of the tall flowering stems equably distributed and ascending: racemes usually several from midway of the stem, narrow and rather strict: sepals thin, yellowish-green, hirsute with mostly

double hairs; petals large, cream-color, obtuse, entire: pedicels much shorter than the pods and distinctly villous throughout; pods linear, acute, ½ to ¾ inch long, slightly contorted, rough-puberulent, tipped with a short and slender style.

From the same region as the last, and by the same collectors; and inexcusably mistaken for *D. streptocarpa*, a plant whose best character is that of being villous and not at all stellate-pubescent. The most robust specimens are those flowering and fruiting luxuriantly as biennials, or at least, the second year from the seed; but others show a perennial duration of the root.

Draba deflexa. Stem stout, erect, 3 or 4 inches high, racemose almost from the base: leaves mostly in a dense rosulate basal tuft, oblong-lanceolate, entire or sparingly toothed, nearly glabrous superficially, but the margin hirsute-ciliate: calyx glabrous, the thin sepals tinged with purple: petals white, showy: pedicels widely spreading, in fruit deflected, much exceeding the pods in length, these elliptic-oblong, ¼ or ⅓ inch long, glabrous, the stigma small and sessile.

Camp Stambaugh, Wyoming, collected in 1878, by Dr. Maghee; specimen preserved in the U. S. Herbarium, without a name.

Thelypodium crenatum. Perennial, the stout stems several from a branching caudex and 3 feet high: herbage green, wholly devoid of bloom: lowest leaves oblong-oblanceolate, obtuse, tapering to a rather long petiole, strongly crenate or crenate-serrate; cauline leaves reduced and scattered, lanceolate, sessile, subentire: racemes short, corymbose-panicled: corollas white, the petals small and obtuse: pod not seen.

Mancos sage plains, southern Colorado, Baker, Earle and Tracy (n. 394); distributed as *T. integrifolium*, but certainly distinct by its perennial roots, thin crenate leaves, and herbage not in the least glaucous.

Amelanchier prunifolia. Stems clustered and bushy, 6 or 8 feet high, the branches stout and rigid, with an ashy bark: leaves small (the largest only an inch long), coriaceous, pale and glaucescent, glabrous on both faces or nearly so, mostly oblong or elliptic and entire, some obovate-oblong and with a few teeth across the obtuse apex, all on slender petioles of ½ inch: fruits few, in a pendulous corymbose raceme, the pedicels an inch long or more and very slender: segments of the calyx narrowly triangular-lanceolate and elongated, in the reflexed fruiting condition reaching almost to the base of the fruit: flowers not seen.

On sage plains and low foothills about Mancos, Colorado, July, 1898, Baker, Earle and Tracy (n. 665). Related to the far northwestern *A. pallida*, and equally xerophilous; but quite distinct by its narrow foliage of different outline, and by its long narrow calyx-teeth.

Amelanchier venulosa. Habit of the preceding, and with similar pale bark, but leaves constantly broad-obovate, entire below the middle, sharply serrate at the obtuse apex, pale beneath, greener above, conspicuously feather-veined, the veins close, in about 8 pairs; pedicels and very short petioles white with a fine tomentum, this reappearing on the triangular-lanceolate segments of the calyx, but the full-grown fruit nearly glabrous; corymbs short, few-flowered.

This is known to me only as collected long ago by Mr. S. B. Parish, at Cushenberry Springs, in southern California. I had referred it to *A. pallida* at first, notwithstanding that its foliage is very different, not being pale except beneath, and being of different outline. But the obvious fine and close venation of the leaves is in marked contrast with the approximate veinlessness of other coriaceous-leaved desert species of this genus.

Notes on Machæranthera.

At page 60 of the preceding volume I named, and gave an outline of the characters of *M. montana*, recording at the same time my suspicion that it would be found an aggregate of several good species. Since the time of that writing I have again visited the habitats of several of these plants; have also examined, in the herbarium of Columbia College, several of Nuttall's specimens not seen by me before; and lastly, Professor Nelson of the Wyoming University has sent me copious material from those high plains where Nuttall himself collected so long ago. I am thus much better equipped than I was three years ago, for the work of identifying, and more fully describing certain of Nuttall's *Dieterias*, most of which fall, according to my view, into the genus *Machæranthera*.

M. viscosa. *Dieteria viscosa*, Nutt. Trans. Am. Phil. Soc. vii. 301. *M. montana*, Greene, Pitt. iii. 60, in part. Biennial; the stems solitary or several, erect, 1 to 2 feet high, usually spicate or racemose in the middle, but more corymbose at summit, or not rarely wholly corymbose: herbage green and seemingly glabrous, but under a lens puberulent, the inflorescence and especially the involucres glandular and viscid: lower cauline leaves narrowly oblanceolate rather remotely but sharply serrate: bracts of the large and nearly turbinate involucre in 5 or 6 series and closely imbricated, their green herbaceous tips long and narrow, closely reflexed and very viscid: rays rich purple, 18 or 20: achenes much compressed, the faces rather obscurely striate under the thin coat of appressed silky pubescence.

Plentiful on plains of the Platte in northern Colorado; the above description based on specimens collected by myself at La Salle, in 1896. The herbage is, as Nuttall said, fragrant; the odor balsamic and very pleasant.

M. PULVERULENTA. *Dieteria pulverulenta*, Nutt. l. c. 300. *M. montana*, Greene, l. c., in part. Biennial, erect, about a foot high, somewhat fastigiately panicled, more or less canescent with a fine pubescence, this on the peduncular branchlets and involucres mixed with sessile or subsessile very minute resiniferous glands: rather small and scattered leaves oblanceolate, entire or serrate-toothed: heads small, subturbinate; involucral bracts in about 3 series, rigid, their short green tips suberect: rays few (8 to 12).

Common on elevated plains in Wyoming, northern Colorado, etc.; a much smaller and more slender plant than *M. viscosa*, and occupying a totally distinct and higher altitudinal belt.

M. DIVARICATA. *Dieteria divaricata*, Nutt. l. c. 301, in part. *M. montana*, Greene, l. c. in part. Rather larger than the last, the branching divaricate and diffuse rather than fastigiate: involucres much larger, hemispherical, their bracts in about four series and with abruptly recurved green tips: rays 12 to 16.

Of the same range as the last, and with similar foliage and pubescence; perhaps confluent or hybridizing with it, yet generally distinguishable even in the herbarium by the involucre and mode of branching. In duration it appears to be biennial.

M. SUBALPINA. Stems several, erect, only 5 to 10 inches high from a perennial root, the heads few and subracemose; herbage cinereous-puberulent, but the involucres and their pedicels viscid-granular: leaves narrowly oblanceolate, acute, entire: heads rather small, the involucres subturbinate, their rather broad erect granular bracts in about 3 series, acute, not spreading: rays 8 to 12, broad, purple.

I have this plant only from Mr. Nelson of Wyoming. His tickets do not indicate the elevation; but I am confident that it must belong to a higher altitude than the foregoing. The locality given is Bacon Creek. It is next of kin to my *M. lætevirens*, but is of different habit, with narrow foliage, and is pale with an ashy pubescence.

M. SPINULOSA. Perennial, the several stoutish erect virgately racemose stems two feet high: foliage green and stems purplish, but the whole minutely puberulent, the inflorescence somewhat glandular: radical leaves with oblong strongly spinose-dentate blade tapering to a rather slender petiole, the cauline linear-lanceolate, saliently serrate-dentate, the stout teeth spinulose-tipped: involucres rather small, turbinate, their rather narrow bracts in about 4 or 5 series, with subsquarrose green tips: rays 7 to 10, rather short and inconspicuous, apparently blue.

Dry hillsides of eastern Oregon, W. C. Cusick, 1897 (n. 1811). Somewhat allied to *M. inornata* of northeastern California; but a very well marked species.

M. MONTANA, Greene, Pitt. iii. 60, excl. syn. *Dieteria pulverulenta, divaricata* and *viscosa.* This name may now stand for the plant of the Californian Sierra which formed a part of the original but aggregate *M. montana.* It is a perennial, pale throughout with a cinereous pubescence, the involucral bracts being glandular. The leaves are all notably and almost pinnately lobed or coarsely toothed, the radical of narrowly oblanceolate outline, the cauline broadly spatulate-linear. The large heads are corymbose rather than racemose; the campanulate involucres well imbricated, the bracts with squarrose green tips.

The species seems to be of only southerly distribution in the Sierra; *M. Shastensis* being its northern homologue.

M. TEPHRODES. *Aster canescens,* var. *tephrodes,* Gray, Syn. Fl. 206. Suffrutescent, the leafy and flowering branches glabrous below, scabrous above; the long linear-lanceolate leaves scabrous beneath and scabrous-ciliolate and with scattered short spinescent teeth: heads few, large, hemispherical, the involucral bracts hoary-tomentulose and not at all viscid or glandular, their tips long and subulate-attenuate, spreading or scarcely recurved.

Mountains of New Mexico and Arizona.

M. OXYLEPIS. Perennial, a foot high or more, the long leafy stems erect, terminating in mostly a single large head, both stem and narrow entire ascending leaves canescently tomentulose, devoid of glands and with no scabrousness: bracts of the hemispherical involucre in about 5 series, merely tomentulose, closely imbricated and rigidly erect, the short green tips acute and those of the inner pungent: rays 15 or 20, large and showy.

Southern Arizona, at Apache Pass, J. G. Lemmon, Sept., 1881.

M. RIGIDA. Root and basal leaves not known, the stout rigid somewhat fastigiately panicled stem probably 2 or 3 feet high; the whole herbage pale with a minute scabrous pubescence intermixed with small resin glands: leaves linear-lanceolate and with a few pairs of short stout divaricate spinescent teeth: involucres very numerous and small, campanulate, their acute erect herbaceous-tipped bracts narrow and in about 5 series: rays small, narrow, rather numerous, but pale and inconspicuous.

Collected at Kearn's Cañon, Arizona, by Miss Zuck, and communicated by Prof. Toumey. A coarse unattractive member of the genus, with heads as small as those of *M. parviflora*, though with twice as many bracts to the involucre, and these less herbaceous.

EARLY SPECIFIC TYPES IN CHAMÆCRISTA.

My paper on CHAMÆCRISTA published somewhat more than a year since[1] was mainly the result of field study, and was designed to exhibit, and to emphasize the taxonomic importance of, those very notable peculiarities of floral structure of which I seemed to have been the discoverer.

[1] PITTONIA iii. 238.

I have, in the interval, given such attention as I was able to give, to history of the genus in times subsequent to Linnæus; and this line of research has proven no less interesting than was that of the field study of the plants in question. Some results of this bibliographic work I desire here to place upon record, for the use of any who may in the future take up and carry forward to completion a classification of the Chamæcrista species.

The genus, proposed as such, and duly published under this name, is ante-Linnæan, as I said formerly; but its real founder is not Commelin (1697) but Breyne (1678). And since 1753, when Linnæus suppressed it, I find four different authors reinstating it anteriorly to my own paper of 1897. And it so far seems to hold perfectly true, as I intimated in the earlier paper, that none of these earlier supporters of the genus studied the corolla to the extent of understanding it and making out its peculiarities. Besides Mœnch (1794 [misprinted 1694 in Pitt. iii, p. 241]), the other and later botanists maintaining the distinctness of these plants from *Cassia* are, Schrank (1805), who gives it a new name, *Grimaldia;* Ernest Meyer (1825), who maintains the prior and rightful name, and Rafinesque (1838); this author also retaining the rightful name, but following his own whim of making the English X stand for a Greek Chi, the name with him reading *Xamacrista,* which he nevertheless must have pronounced Kamacrista.

Again: all authors from Linnæus down to our time who have monographed the Cassias—Linnæus (1753 & 1762), Colladon (1816), De Candolle (1825), Vogel (1837) and Bentham (1871)—have admitted *Chamæcrista* as a subgenus, and have placed it last in the series, as made up of plants the most remote of all from the true type of *Cassia.*

In so far as my examination of these authors has proceeded, I observe that while with all of them the members of the *Chamæcrista* section are veritable Chamæcristas, yet other excellent species of the same group are found to be

isolated completely from their nearest kindred, and lurk in the most improbable places here and there among the other sections of *Cassia*. In the first edition of Linnæus there occurs a fine illustration of this. On pages 379 and 380, under the heading,

"* Chamæcristæ, *foliolis numerosis*,"

we have an unbroken succession of true CHAMÆCRISTA species; but then, the very first *Cassia* which he enumerates, (on page 376) *C. diphylla*, is as perfect a *Chamæcrista* as any, and should have been ranged with its congeners at the end of the series.

In the following partial enumeration of CHAMÆCRISTA species, I shall follow the chronological order of things, beginning with Linnæus and the year 1753. Certain of these species of 1753 were sufficiently indicated in my former paper. The following have now been determined by me as being genuine Chamæcristæ.

C. MIMOSOIDES. *Cassia mimosoides*, Linn. Sp. 379. To this widely dispersed East Indian type (the original from Ceylon) Mr. Bentham reduces—though not without evident misgiving—more than twenty species that had been published by various authors; among these *Chamæcrista stricta* and *C. plumosa* of E. Meyer. I do not find that any figure has hitherto been published of typical *C. mimosoides*.

C. FLEXUOSA. *Cassia flexuosa*, Linn. l. c. Tropical America is the habitat of this; and it was published as a *Chamæcrista*, not as a *Cassia*, in pre-Linnæan times, by Breyne with a beautiful folio plate, this plate being Linnæus' type for the species as a *Cassia*. It is the historic type of what should be made a section of *Chamæcrista* marked by a strong development of the stipule. In some of the more recent species of this group the stipule is still more strongly developed, and that at the expense of the leaflets, which in some of them are very few, in others almost or altogether wanting.

C. PROCUMBENS. *Cassia procumbens*, Linn. l. c., not of Thunberg, nor of Loureiro. An American and subtropical species, with which Linnæus, in the second edition of his *Species*, confused a somewhat similar Old World type.

C. DIPHYLLA. *Cassia diphylla*, Linn. l. c. Cav. Ic. t. 600. Species exclusively American, though Linnæus made the mistake of attributing it to "India." That the species is a good member of the *Chamæcrista* group appears to have been discovered by Colladon; and since then all authors have so placed it. In the figure by Cavanilles the Chamæcrista habit, inflorescence, and corolla are very clearly brought out.

Coming now to the second edition of the *Species Plantarum*, it is to be observed that in this work four new species are added to the genus *Cassia;* and three of them are Chamæcristas, though but one is there placed in its proper group, the others being ranged with the Sennas. In *Chamæcrista* they will receive names as follows:

C. PILOSA. *Cassia pilosa*, Linn. Sp. 2 ed. 540; Collad. Hist. Cass. 122, t. 20, f. A. *C. emarginata*, Mill., and *C. Milleri*, Collad., according to Bentham. Plant originally from the Island of Jamaica, and first published by Patrick Browne in 1756. Not recognized as being a *Chamæcrista* by Linnæus, or Willdenow, but apparently first assigned its place in this series by Colladon.

C. GLANDULOSA. *Cassia glandulosa*, Linn. l. c. 542; Colladon, l. c. 129 in part. Also West Indian, and first published by Breyne, in 1678, with an excellent plate (Cent. t. 24). In his first edition Linnæus referred it to his *Cassia Chamæcrista;* but here in the second edition he segregates it. Colladon has again confused things by citing under *C. glandulosa* Commelin's *Hortus Amstelodamensis*, t. 37, which not only represents a totally distinct species, but is,

if I mistake not, the type of *Chamæcrista pavonis*, the real *Cassia Chamæcrista*, Linn. Of this very old type-species Mr. Bentham appears to have made another of his favorite jumbles, by reducing to it seven species of other authors.

C. SERPENS. *Cassia serpens*, Linn. Sp. 2 ed. 541; Colladon, l. c. 128. Native of Jamaica, and also of the small-flowered group to which *C. nictitans* belongs.

After the second edition of Linnæus' *Species*, the next work of importance to general botany is the eighth edition of Miller's *Gardeners' Dictionary*. In this are published a very considerable number of new Cassias that had been unknown to Linnæus; but none of these are recognizable as of the *Chamæcrista* genus. However, it is easily discoverable by his excellent description of what he calls *C. chamæcrista*, that it is not the plant which Linnæus had so named, but a really new *Chamæcrista*. Colladon in 1816 discovered this fact, and assigned the species a name. Then again, as late as 1895, by an American botanist it was described and named anew. Its name and synonymy must here be given.

C. CHAMÆCRISTOIDES. *Cassia chamæcristoides*, Collad. Hist. Cass. 134. *C. Chamæcrista*, Mill. Dict., not of Linn. *C. depressa*, Pollard, Bull. Torr. Club. xxii, 515. *Chamæcrista depressa*, Greene, Pitt. iii. 242. Miller seems to have doubted as to the identity of his plant with the true *Cassia Chamæcrista*; for he says that it differs in having a "trailing stalk; the leaves are much shorter, having but half the number of pinnæ, which are also narrower and shorter." And these are precisely the characters upon which Mr. Pollard established his *C. depressa*. The description in Miller (1768) and that in the paper of 1895, are so completely harmonious that, were the two plants obtained from opposite hemispheres, we should still think them one; and when it is known both types came from opposite shores of the same subtropic sea, the

Gulf of Mexico, all cause of doubt as to their specific identity is banished.

Seven years subsequently to the appearing of Miller's eighth edition Forskaal issued his *Flora Ægypto-Arabica*, and there is catalogued in this book an Arabian "*Cassia procumbens?* caule erecto." Vahl afterwards, presumably after having critically examined the specimens, published this as new, under the following specific name:

C. NIGRICANS. *Cassia nigricans*, Vahl, Symb. i. 30 (1790); Colladon, l. c. 113. *Cassia procumbens*, Forsk. Fl. Ægyp.-Arab. CXI (1775), not of Linn. Colladon seems to have felt some doubt as to whether this species should be reckoned a *Chamæcrista* or a *Chamæsenna;* but Forskaal's having taken it for specifically identical with so typical a *Chamæcrista* as *C. procumbens* would of itself almost warrant the conclusion that it must be of this group; and Vahl's description leaves no room for doubt. I do not ascertain that the species has ever been figured.

Among the new Cassias published by Lamarck in 1783, and by Thunberg in 1784, the following are certainly of the present genus:

C. ANGUSTISSIMA. *Cassia angustissima*, Lam. Encycl. i. 650. An East Indian kind, known well enough long before Linnæus, and neatly figured by Plukenet, *Almagestum*, t. 5, f. 2. and also by Rumphius.

C. BREVIFOLIA. *Cassia brevifolia*, Lam. l. c. 651; Colladon, Hist. Cass. 123, t. 19. Native of Madagascar.

C. CAPENSIS, E. Mey., in Linnæa, vii. 172. *Cassia Capensis*, Thunb., Prod. 79. Indigenous to the Cape of Good Hope; figured in Colladon, t. 19.

At least two of the Cassias published as new by Swartz in 1788 are *Chamæcristæ*, namely,

C. VIRGATA. *Cassia virgata*, Swartz, Prodr. 66, and Fl. Ind. Occid. 728. Belongs to the West Indian archipelago.

C. LINEATA. *Cassia lineata*, Swartz, Prodr. 66, and Fl. Ind. Occid. 726. Island of Jamaica.

Persoon among his new Cassias of 1805 had two which are of this genus; one of them having been assigned by him an untenable specific name, as will be seen below.

C. ROTUNDIFOLIA. *Cassia rotundifolia*, Pers. Syn. i. 456; Colladon. Hist. Cass. 119. Native of South America.

C. PERSOONII. *Cassia Persoonii*, Collad. l. c. 119 (1816); *C. lanceolata*, Pers. l. c. (1805), not of Forsk. (1775). Also South American.

Colladon, whose fine monograph, published in 1816, is now a classic, may naturally stand last in the line of early post-Linnæan authors who contributed the knowledge of several new species belonging to this genus; and with these we conclude the present paper.

C. BREVIPES. *Cassia brevipes*, DC., in Collad. l. c. 119, t. 9, fig. A. The species is Central American, and is one of many Chamæcristæ in which the leaflets consist of only a single pair, but of which the whole habit, and every character of inflorescence and flower and fruit, are at agreement with this generic type.

C. BIFOLIOLATA. *Cassia bifoliolata*, DC. in Collad. l. c. 120, t. 9, fig. B. Of Mexico and Central America.

C. CUNEATA. *Cassia cuneata*, DC. in Collad. l. c. 121. Indigenous to South America.

C. HECATOPHYLLA. *Cassia hecatophylla*, DC. in Collad. l. c. 124, c. 18. Native of islands of the Caribbean Sea.

C. PATELLARIA. *Cassia patellaria*, DC. in Collad. l. c. 125, t. 16. Isthmus of Panama and regions adjacent.

C. CALYCIOIDES. *Cassia calycioides*, DC. in Collad. l. c. 125, t. 20, fig. B. Northern South America.

C. ÆSCHINOMENE. *Cassia æschinomene*, DC. in Collad. l. c. 127, t. 17. Native of the West Indies; perhaps represented in Breyne's old plate 24, of the *Centuriæ;* if so, then forming a part of the very complicated *Cassia Chamæcrista* of Linnæus. But the present species is evidently much nearer *C. nictitans.*

New Species of Sisyrinchium.

S. LANGLOISII. Densely tufted and very slender stems 3 to 5 inches high, from a cluster of long slender rather wiry fibrous roots: leaves very narrowly linear, 2 to 4 inches long, erect, glabrous, closely and strongly about 5-striate: stems scarcely ancipital, rather subterete with a pair of strong keel-like angles, all parted in the middle into from 2 to 4 slender peduncles each with a single small few-flowered spathe, its bracts equal or nearly so, acuminate: pedicels short, filiform, perianth large for so small a plant, blue (evidently pale), the broad segments alternately merely obtuse and abruptly apiculate-acuminate, and retuse with a triangular-subulate cusp: stamens and pistil short, scarcely half the length of the perianth: fruit not seen.

In meadows about St. Martinville, Louisiana, 11 April, 1892, Rev. A. B Langlois; said to be very common.

S. XEROPHYLLUM. Plant with a distinct though short erect or ascending rootstock bearing rather coarse densely

tomentose fibrous roots; basal portion of the plant above ground sheathed with a rather heavy fibrous coat of dead remains of the foliage of other seasons: leaves and scapes of about equal length and more than a foot high, all of rather hard and dry texture: leaves pale and glaucescent, about 9-striate and very minutely crystalline-granular between the lines: slender scape ancipital, with about 3 lines on either side of the midrib, and minutely denticulate on the almost hyaline edges, the summit bearing two or more peduncled spathes, the cluster subtended by a long bract; spathes many-flowered, their bracts about equal, acute, strongly striate: flowers and fruits not seen.

Collected by Mr. Nash, on high pine lands near Eustis Lake, Florida, 1894, and distributed for *S. Bermudiana*; but representing a new species most strongly characterized by its distinct underground stem, tomentose roots, and the fibrous-sheathed tuft of leaves and scapes.

S. LITTORALE. Plant of rather thin and flaccid deep-green herbage darkening in drying: leaves few and short, though broad, seldom more than two or three, of only about half the height of the scape, somewhat ensiform, 7-striate and the lines rather remote: scape solitary, a foot high or less, ancipital, bearing a single spathe, the bracts very unequal, the lower fur surpassing the flowers: perianth rather large, ½ inch long, violet, the segments alternately obtuse and retuse, all subulate-cuspidate: fruit not seen.

A maritime species, growing among mosses, grasses and rushes, along the shores of Yes Bay, Alaska; collected by Mr. Gorman in July, 1895, and by Mr. Howell at about the same time; all the specimens in flower only.

S. MONTANUM. Plant stout, erect, more than a foot high, herbage light-green, glabrous, not glaucescent: foliage rather copious but short, of less than half the length of the scapes, the broad leaves about 9-striate, the alternate lines com-

monly rather obscure; scapes ancipital, each of the broad, sharp-edged subentire wings strongly 3-striate: spathes mostly solitary, their bracts very unequal, the outer of more than twice the length of the inner and 1½ to 2 inches long: perianths apparently dark-purple; capsules large (nearly ¼ inch in diameter), almost globose, very sparsely hairy.

Meadows along the Mancos River, southern Colorado, Baker, Earle and Tracy (n. 113), 25 June, 1898; also by the same on Chicken Creek in the La Plata Mountains, at 9,000 feet, 7 July (n. 377). A large and doubtless showy species, exceeding even the Californian *S. bellum* in size.

S. HALOPHILUM. Low and slender, tufted, wiry and glaucous, the fibrous roots coarse but rather soft: narrow leaves about half the length of the scape, and very strongly 5–7-striate: scapes 5 to 8 inches high, terete and very narrowly winged rather than ancipital, one of the wings, even, occasionally almost obsolete: spathes small, solitary, their bracts nearly equal: perianth not seen: capsules small, pyriform, scabrous-pubescent, containing few and large seeds, these dull-black, nearly smooth.

Collected at the Humboldt Wells, near Wells, Nevada, 25 July, 1893, in fruit only. The species bears some superficial likeness to another halophilous species belonging to Arizona, *i. e.*, *S. demissum*, discovered by me in 1889, near Flagstaff. But that has very numerous and almost minute seeds with a very rough testa; it also has a branching stem bearing two or more spathes. Here the stem or scape is perfectly simple and unispathaceous, the seeds being few, large, and with an almost smooth testa. It is more than possible that this Humboldt Valley plant may prove to have a wider distribution, and be found to include certain flowering specimens which are rather numerous in my herbarium, from various points in western Nevada, and from Californian stations east of the Sierra.

New or Noteworthy Species.—XXIV.

Ribes aridum. Near *R. amictum*, the stems much stouter, rigid and flexuous, with puberulent bark, the nodes bearing short very stout recurved triple spines: leaves small, canescently hirtellous on both faces: peduncles 2-flowered; calyx-tube funnelform, the lobes oblong, the whole calyx hoary-tomentulose, dark-red within: fruits small, armed with short and stout (slender-conical) spines, in maturity bursting on one side and ejecting the pulpy mass of the seeds, the pericarps persisting during the succeeding winter.

A remarkable species, discovered among the arid foothills of the Californian Sierra near Caliente, Kern County, in 1893, by Mr. N. C. Wilson. The specimens are scarcely yet in flower, having been collected in January, but show buds near the time of expansion, the branches being still loaded with the dry pericarps of the preceding year. The characters of the branches, spines and foliage alone, would abundantly distinguish the species from *R. amictum* to which I at the time too hastily referred the specimens.

Ribes cruentum. Shrub of the size and habit of *R. amictum*, but wholly glabrous, leaves with their lobes less crenate: flowers larger, the whole calyx with its almost cylindric tube and long spreading segments deep crimson: petals white or pink, not strongly involute, laciniate-dentate across the obtuse apex: ovary and berry strongly aculeate.

Species common in the Californian Coast Range, from Sonoma Co. northward into southern Oregon. Some specimens of it were present when *R. amictum* was first described, and from these the term "glabrate" found place in the diagnosis, the specimens cited from Hoopa Valley being of the present species, not the true *R. amictum*. This last,

though occurring at the north as far westward as the interior of Humboldt Co., is properly a shrub of the Sierra Nevada; is always tomentulose even to the outside of the calyx, and has a shorter broader flower, with quite different petals, these being only erose-dentate, and much thicker and more waxy in appearance than those of *R. cruentum.*

ARNICA MERRIAMI. Stems from ascending rootstocks, slender, simple, monocephalous, about a foot high: lowest leaves upright, oblong-lanceolate, slenderly petiolate, entire obscurely 3-nerved; the cauline in two pairs, lanceolate, sessile, entire or denticulate, all sparingly pubescent and somewhat glandular; the peduncle of the large head glandular-hirsute: bracts of the campanulate involucre lanceolate-acuminate, purplish: rays and disk saffron-color: pappus pale-fuscous and subplumose; achenes sparsely hirsute, not glandular.

This species is known to me only as an alpine plant of the Californian Sierra; and it has passed heretofore as A. *alpina*, which is European. It is here described from specimens obtained on Mt. Shasta, 18 July, 1898, by Dr. C. Hart Merriam, who observes that it is an associate of *Bryanthus*. From *A. fulgens*, Pursh, which is its lowland homologue, occurring from along the eastern foothills of the Sierra northward and eastward to and beyond the Rocky Mountain plains, both its leaves, flowers and pappus abundantly distinguish it: for *A. fulgens* has a prominently 5-nerved foliage of another outline, oblong and merely acutish bracts, yellow flowers, and a whitish merely barbellulate pappus.

ARNICA RYDBERGII. About a foot high, from an ascending rootstock, simple and rather leafy up to the 2 or 3 slender-peduncled and subcorymbose heads, apparently all the leaves opposite, and the lowest subradical pair very small, these spatulate-oblong, denticulate, those next above much larger, similar in outline, indistinctly 3-nerved, re-

motely but saliently dentate, the uppermost pair reduced, broadly ovate, abruptly acuminate: involucres narrow and rays few, all the flowers light-yellow: achenes silky-villous, not glandular; pappus fine and white, barbellate.

This is Mr. J. C. Flodman's n. 891 (of my set) from the Little Belt Mountains, Montana, 1896, distributed for *A. fulgens*, to which it bears no particular resemblance. It is even nearer what we call *A. latifolia* Bongard, though the leaves are narrow. These are in about five pairs, and are not notably pubescent or glandular.

Agoseris monticola. Root stout, elongated and deep-seated, simple in young plants, in the older multicipitous and bearing several tufts of depressed leaves and short scapes: herbage very pale and glaucous, glabrous or more or less tomentulose: leaves from obovate and entire to narrowly lanceolate and toothed or pinnatifid: scapes stoutish, mostly 2 or 3 inches high, its upper part glandular-hairy; outer involucral bracts ovate or ovate-lanceolate, the inner narrowly lanceolate: achenes linear-fusiform, distinctly narrowed at summit and this portion vacant (not filled by the seed); pappus dull-white, very firm, scarcely scabrous.

A common and well marked species inhabiting the summits of the higher mountains of the middle and northern Californian Sierra, formerly referred to *A. glauca*. The description is drawn mainly from specimens collected on Mt. Shasta, in 1898, by Dr. C. Hart Merriam. I gathered it myself, near Donner Lake, as early as 1874, and Mr. Pringle once distributed excellent specimens from, I think, the vicinity of Mt. Shasta.

Lactuca campestris. Stout, low and very leafy, seldom 2½ feet high, with a broad but short panicle: leaves ample, pinnatifid and toothed, the teeth sharp and salient, all the foliage sessile by a broad and somewhat sagittate clasping base, the midvein beneath prickly, the whole plant other-

wise glabrous: involucres ¾ inch long, the outer bracts elongated deltoid, the inner oblong-lanceolate: flowers blue: achenes nearly black, compressed, sharply angled and with one sharp carinate nerve traversing the flattened face: filiform beak about equalling the achene; pappus very fine, bright-white.

Common on open prairies in southwestern Minnesota; collected by the writer at Prairie Junction, 7 July, 1898. With much the general likeness of a low and very leafy *L. leucophæa*, this plant drew my attention as something wholly distinct from that woodland species by its clear white pappus. I gathered specimens, not doubting that it was a new species, yet left them lying without examination or comparison, until, in January, in the first issue of *Rhodora*, there appeared an account of a new *Lactuca Morssii*, blue-flowered but with white pappus, from New England. Then I conceived that Dr. Robinson's species must probably be the same as my unpublished one from Minnesota. But now, upon actually investigating my plant in the light of the description and figure of *L. Morssii*, I perceive that they can not be the same; the prairie species exhibiting an extremely different foliage, much larger heads, and a one-nerved achene.

Campanula Wilkinsiana. Glabrous perennial, the upright leafy few-flowered stems 3 to 6 inches high, from very slender rootstocks: leaves from obovate-cuneiform and toothed across the summit only, to oblong-lanceolate with serrate-toothed margins: flowers 1 to 3, on slender erect peduncles: calyx obpyramidal, the erect lanceolate entire teeth more than equalling the tubular portion: corolla deep blue-purple, funnelform, erect, cleft nearly to the middle, the segments moderately spreading: style about equalling the corolla.

Head of Squaw Creek, Mt. Shasta, California, at an altitude of about 8,000 feet, August and September, 1898, Miss Lewanna Wilkins. A beautifully distinct *Campanula*, with

no very near relative south of Alaska and the Olympic Mountains; and perhaps nearest *C. aurita*, Greene, of those regions. The calyx in *C. Wilkinsiana* is destitute of auricles or appendages.

PYROLA PALLIDA. Near *P. picta*, but smaller, the foliage altogether of a pale glaucous green and not mottled: leaves from obovate and obtuse to almost elliptical, subcoriaceous and with a narrow entire callous margin: raceme rather dense; petals greenish, distinctly 3-nerved.

Common on dry mountain sides, in the pine belt of the inner ranges of northern California and Oregon; the species well represented by Mr. Cusick's n. 1714 of his East Oregon collection of 1897, and also by my own 933 distributed from near Yreka, in 1876, both sent out under the name of *P. picta*. Dr. C. Hart Merriam has lately shown it to me as collected by himself on Red Cone, near Mt. Shasta, July, 1898, and his insistence upon it as a plant wholly distinct from *P. picta* has led me to examine into its characters, with the result of my coming to a full agreement with him in his opinion. *P. picta* is a plant of the moist woods that lie along the northwestern seaboard; and its large dark green but strongly white-blotched leaves are in vivid contrast with those of this denizen of the dry interior.

PHACELIA FRIGIDA. Dwarf tufted but erect perennial, the short crown or caudex clothed with persistent dead leaves of preceding seasons; leaves crowded around the base of the short peduncles and on sterile lateral shoots, all simple and entire, with elliptic plicate-veined and silvery-strigulose blade of less than an inch in length, and a stout hirsute petiole as long: calyx-segments linear, hispid with scattered white bristles and destitute of other pubescence: corollas subcylindric, little surpassing the calyx, apparently whitish, stamens and styles exserted: capsule by abortion 1-seeded.

Alpine on Mt. Shasta, California; collected by Dr. Merriam, 3 Aug., 1898. Species of the typical group of the genus; but all its immediate relatives are large plants, and of lower altitudes.

Antennaria confinis. Stems tufted, suffrutescent, ascending, very leafy, 6 to 10 inches high including the sparingly bracted scapiform peduncles: leaves spatulate-oblong, obtusish, mucronulate, about ½ inch long, 1-nerved, densely silky-tomentose on both faces: heads 5 to 9, subsessile and glomerate at summit of the bracted peduncle: involucre small and rather short, the bracts with brownish-yellowish very obtuse scarious tips from obovate in the outer series to oblong in the inner: bristles of the pappus short and rather rigid: male plant unknown.

Species based on specimens obtained in the Santa Catalina Mountains, Arizona, in June, 1880, by Mr. J. G. Lemmon. It is of the group to which belong *A. media* of the Sierra Nevada, and *A. umbrinella* of the northern Rocky Mountains; but is distinctly suffrutescent, the stolon-like branches of the early part of the season remaining proper branches, not rooting. The involucres differ from those of *A. umbrinella* in that the scarious tips of the bracts are firmer in texture, and of only a brownish-creamy color.

Antennaria nemoralis. Blade of radical leaves round-obovate to cuneate-obovate, very obtuse and notably mucronate, 1 to 1½ inches long, lightly 3-nerved, glabrate above, the rather slender petiole an inch long or more: stolons elongated, scarcely leafy except at apex, the growing leaves thinly tomentose above, densely so beneath: flowering stems (only the male known) 3 to 6 inches high, with linear-acuminate bracts: heads 6 or 8, the central sessile, the others short-stalked, white tips of the involucral bracts oblong, obtuse or truncate: tips of the pappus bristles lanceolate, serrulate or subentire.

Said to be common in groves and open woods about Knoxville, Tennessee; collected by A. Ruth, but the male plants only have been sent me; and these resemble those of *A. decipiens* (Pitt. iii. 321); but their stolons are longer and more depressed; their mature foliage is of another outline, and its upper surface is glabrate in maturity, while the tips of the pappus-bristles are much broader and less serrate. It is unfortunate not to know the female plant of a species so well marked.

Chrysothamnus formosus. Low, branched from the base, forming dense almost spherical masses about a foot high; both the branches and very narrowly linear spreading foliage white with tomentum; all the branchlets terminating in a large and dense cyme of rather elongated heads; branchlets of the cyme and their smaller bract-like leaves white-tomentose, but the involucres wholly glabrous, their bracts numerous, 6 or 7 in each of the very distinct vertical ranks, the very short outer ones ovate; the inner successively longer, the inmost oblong-linear, all obtuse or acutish: corollas and achenes not known.

A very elegant species, most distinct in habit and characters of the involucre, found only by the writer, in the neighborhood of a mineral spring among the hills a few miles southwest from Grand Junction, Colorado, 27 Aug., 1896;

at which time the shrub, though very showy with its fine white foliage and dense clusters of bright straw-colored involucres, was not yet quite in flower.

All the following Chrysothamni, which were placed as doubtful varieties of *C. speciosus* in the third column of Erythea, I am now more fully convinced deserve the rank of species.

C. GNAPHALODES. *C. speciosus*, var. *gnaphalodes*, Greene, Eryth. iii. 110.

C. LATISQUAMEUS. *C. speciosus*, var. *latisquameus*, Greene, l. c.

C. ARIZONICUS. *C. speciosus*, var. *Arizonicus*, Greene, l. c.

C. PLATTENSIS. *C. speciosus*, var. *Plattensis*, Greene, l. c. 111.

The essential characters of all the above are given in the place cited, and need not be here repeated.

GRINDELIA OXYLEPIS. Apparently annual (possibly biennial), erect, rather slender, about a foot high, simple and leafy up to the corymbose summit, or with a few divergent branches; stem glabrous, white and shining: leaves small and narrow, spatulate-oblong or oblanceolate, remotely serrulate, one-nerved, sessile by a broad auriculate-clasping base, or the auricles adnate to the stem: involucre low-hemispherical, ½ inch broad or more, its bracts subulate-lanceolate, their short green tips not spreading, the inner very acute, almost spinescent-tipped: rays few and broad: achenes small, truncate at both ends, from slightly compressed and with two angles, to somewhat triangular and quadrangular, the spaces between the angles somewhat striate; pappus bristles 2 to 4, twice the length of the achene, very slender for the genus and perfectly smooth.

Moist plains near Chihuahua, Mexico, C. G. Pringle, 1886,

n. 748 in my herbarium, distributed for *G. squarrosa*, to which it is as much related as to any other *Grindelia*, yet remarkably distinct by characters of involucre, achene and pappus.

Hymenopappus lugens. Near *H. luteus*, and with similar multicipitous caudex and leafless pedunculiform stems about a foot high, but more slender, the monocephalous branches of the inflorescence longer and more divergent; herbage less tomentose, often green and almost glabrous: involucres smaller, campanulate, their bracts distinctly biserial, the outer shorter, oval or broadly oblong, showing a rather broad dark-purple margin, the inner cuneate-obovate, not margined: corollas greenish-yellow, elongated, the narrow subcylindric throat much longer than the proper tube: achenes silky-villous; scales of the pappus oblong-obovate, as long as the proper tube of the corolla and exceeding the villous hairs of the achene.

Inyo and San Bernardino counties, California, collected and distributed apparently only by Mr. S. B. Parish, whose earliest specimens were sent out as representing a variety of *H. luteus*, the later ones being labelled *H. filifolius*.

Silphium helianthoides. Stem 3 to 5 feet high, obtusely quadrangular, striate between the angles, glabrous, leafy; leaves all opposite, elongated-ovate, 4 to 6 inches long including the petiole of an inch, more or less, thinnish, lightly and irregularly serrate-dentate, or the uppermost subentire, all scabrous above, scarcely so beneath: heads in a rather ample sessile dichotomous cyme, their peduncles scabro-hispidulous: large inner bracts of the involucre broadly obovate, very obtuse, the outer successively shorter, relatively less broad and less obtuse, all hispid-ciliolate: achenes narrowly and somewhat cuneately obovate, narrowly winged.

The plant thus named and described is probably included by recent authors in *S. trifoliatum*, and may form a part of

Gray's variety *latifolium* of that species. It is also the *S. lævigatum* of Elliott, by the description, but can not be that of Pursh. The species is well represented in Mr. Ruth's n. 777, from near Knoxville, Tennessee, of the collection of 1898.

Silphium collinum. Stem terete, stoutish, striate, 3 to 6 feet high, glabrous, glaucescent, sparsely leafy, all the leaves alternate, petiolate, the petioles about as long as the blades; these of broadly ovate outline, commonly cordate or subcordate, angulate-lobed, the lobes entire or toothed: heads in an ample panicle, small; outer bracts of involucre ovate, the inner oblong-ovate, all obtuse, glabrous, only the margins scabrous-ciliolate: rays about 5, little more than ½ inch long: achenes puberulent, strongly obcordate, the wings so ending as to form a narrow and deep notch; awns not manifest, apparently wanting.

Mountains of eastern Tennessee to those of western Georgia; not rare in collections, but mistaken for a form of *S. compositum*, which is a plant of the lowlands of the southern seaboard, of half the size of the present species, with leafless and scapiform stem, the foliage appearing as if ternately compound (whence the name *compositum*).

Silphium Simpsonii. Stem a yard high, more or less, stoutish, terete and striate, very leafy, the leaves in twos or threes or alternate, mostly oblong-lanceolate, from repand to coarsely crenate or crenate-dentate, sparsely scabrous on both faces, the margins strongly so, the uppermost ovate, sessile by a broad and half-clasping base: heads large, long-peduncled; bracts of involucre ovate, obtuse or acute, puberulent and scabrous-ciliate: achenes large, nearly ½ inch long inclusive of the wings, these broadest at the summit, ending to form an acutely triangular deep notch.

Collected at Palma Sola, Florida, by Simpson, July, 1890; the specimens preserved in the U. S. Herbarium.

Silphium incisum. Stem 2 feet high, rather slender, with a few pairs of reduced opposite leaves; the principal foliage radical and large, with elongated-ovate blade 6 or 8 inches long (the hirsute petioles nearly as long), coarsely and incisely though not deeply toothed, sparsely strigose-hispidulous on both faces; cauline leaves lanceolate, incise-toothed, the lower pairs petiolate, the upper sessile: heads in a naked-peduncled cyme; involucral bracts oval to ovate, glabrous, ciliolate: achenes oval, narrowly winged marginally, but the wings abruptly produced at summit into a pair of broadly subulate teeth half as long as the body of the achene and forming a deep obtusely triangular notch.

Peculiar species, known to me in a single, but very good specimen, preserved in the U. S. Herbarium; collected near Rome, Georgia, July, 1888, by Gerald McCarthy.

Neglected Generic Types.—I.

PHYLA.

Loureiro, Fl. Cochin. 66 (1790). *Zapania*, Lam. i. 58, t. 17 (1791). *Platonia*, Rafinesque, N.Y. Med. Repos. v. 352 (1808), and *Piarimula* of the same, Fl. Tellur. ii. 102 (1836). Species of *Verbena*, with Linnæus and pre-Linnæan authors; of *Blairia*, Gærtner; of *Lippia*, Michx., and many more recent works.

The type of this genus, known for a century or more before Linnæus as *Verbena nodiflora*, was retained in the *Species Plantarum* under that name. In general aspect the plant is more like certain species of *Verbena* than anything else; but this superficial likeness is deceptive. The simplest examination of its inflorescence and fruit discloses characters indicative of a much nearer affinity to *Lantana* and *Lippia*, these two representing a verbenaceous type very far removed from *Verbena* itself; for the group of which the last-named is

typical has a fruit consisting of four distinct nutlets, while the *Lantana-Lippia* assemblage all have their carpels consolidated. *Lantana* itself is characterized essentially by a drupaceous fruit, and *Lippia*, as to its type-species, is so much like *Lantana* in habit, inflorescence, and general aspect, that only the absence of fleshiness to the pericarp separates it from that genus. Both *Lantana* and *Lippia* are coarse rough-leaved shrubs. *Phyla* on the other hand is a small genus of more or less creeping perennial herbs of altogether peculiar habit and aspect; and they have a pubescence most characteristic, consisting of sessile forked hairs. This kind of pubescence occurs in several genera of the Cruciferæ; but in the Verbenaceæ it does not occur except in *Phyla*. In those extremely Lantana-like shrubs constituting typical *Lippia* the calyx is oblong-campanulate simply, with being compressed or flattened. In *Phyla* this organ is flat by compression, its two lobes being conduplicate. Hardly even *Verbena* itself is more definitely limited than is *Phyla*, both by habit and character.

The earliest botanist to propose the separation of this type from *Verbena* appears to have been Gærtner in 1788; but he merely appends the type-species to his genus *Blairia;* so that it can not be received as the type of that genus. But Lamarck three years later seems to receive *Verbena nodiflora* as the type-species of his genus *Zapania;* and it has been under this name that the various supporters of the genus have ranged the species; but Loureiro's *Phyla* is also based on *V. nodiflora*, and enjoys a year's priority over *Zapania*.

I can not attempt a full enumeration of the species; but all the following are known to me either by field acquaintance or in herbarium specimens, or both.

P. NODIFLORA. *Verbena nodiflora*, C. Bauh. Prodr. 125. Icon. (1620); J. Bauh. Hist. iii. 444. Icon. (1651); Moris. Hist. iii. sect. 11, t. 25, fig. 8 (1699); Barrelier, Icon. Rar.

t. 855 (1714); Linn. Sp. Pl. 20 (1753). *Blairia nodiflora*, Gærtn. Fr. et Sem. i. 266, t. 56 (1788). *Zapania nodiflora*, Lam. Illustr. i. 59, t. 17, fig. 3 (1791); *Phyla Chinensis*, Loureiro, Fl. Cochin. 66 (1790). *Lippia nodiflora*, Michx. Fl. ii. 15 (1803). *Platonia nudiflora* (misprint for *nodiflora?*), Raf. N. Y. Med. Repos. v. 352 (1808). *Piarimula Chinensis*, Raf. Fl. Tellur. ii. 102 (1836).

If all that passes under this name is one species, it certainly has a most remarkable geographic range, being found in the tropical and subtropical parts of all the continents and of every archipelago that lies within those lines. It is curious that Linnæus names only "Virginia" as the habitat of the species, while it had been known as thoroughly indigenous to the Mediterranean regions of the Old World for at least a hundred years before his day.

P. LANCEOLATA. *Lippia? lanceolata*, Michx. Fl. ii. 15 (1803). *Zapania lanceolata*, Juss. Ann. Mus. Par. vii. 72 (1806). Indigenous to the Middle and Southern United States, probably also extending to Mexico, and even to Central America if the *Lippia Queretanensis* of Kunth be, as some suppose, the same species.

P. CUNEIFOLIA. *Zapania cuneifolia*, Torr. Ann. N. Y. Lyc. ii. 234 (1826). *Lippia cuneifolia*, Steud. Nom. ii. 54 (1841), Torr. Marcy's Report 261, t. 17. A very strongly marked halophilous species, common on moist subsaline or alkaline plains of the Rocky Mountain region, ranging westward to California, southward to Arizona and perhaps Mexico, and with a near relative or two in South America.

P. REPTANS. *Lippia reptans*, HBK. Nov. Gen. et Sp. ii. 263 (1817). Common in tropical America; allied to the preceding, but its obovate-cuneate leaves are strongly pinnate-nerved and distinctly plicate, thus differing greatly in appearance from those of any United States *Phyla*.

P. CANESCENS. *Lippia canescens*, HBK. l. c. Widely dispersed in tropical and subtropical South America, inhabiting grassy plains; the leaves much larger than in the preceding, not in the least plicate, but quite plane.

P. BETULÆFOLIA. *Lippia betulæfolia*, HBK. l. c. 264. Indigenous to northern South America; marked by larger leaves of rhombic-ovate outline, with impressed pinnate veins, and coarse sharp serrate teeth. Though strictly of this genus, Mr. Bentham is said to have made it the type of a new one, *Cryptocalyx nepetæfolia*, see DC., Prodr. xi. 584.

SIEVERSIA.

Willdenow, Berl. Mag. v. 397 (1811); R. Br. in Parry's First Voyage, App. 276 (1824); G. Don, Gen. Syst. ii. 527 (1832). Species of *Geum* with most earlier and later authors.

The essential characters of *Sieversia* as distinguished from *Geum* are those of its style; this organ here being slender, straight, continuous without articulation or bend, and in fruit wholly persistent and plumose; whereas in *Geum* it is short, stiff, jointed and bent at or near the middle, the upper portion eventually falling away. It is therefore a more strongly fortified genus than is *Pulsatilla* as compared with *Anemone;* for in this instance the style in neither genus is either bent or jointed or in any part deciduous; and *Pulsatilla* rests on no other character of fruit than its elongated and slender plumose styles. It is habitally somewhat unlike *Anemone*, yet not more so than *Sieversia* is unlike *Geum;* so that, on the whole, *Sieversia* is a better genus than *Pulsatilla;* and there have not been wanting eminent botanists who maintained the former while declining to give recognition to *Pulsatilla*, as for example Sir William Hooker in the *Flora Boreali-Americana;* George Don in the *General System*, and Endlicher, *Genera Plantarum;* and there are others; while the extreme of inconsistency is chargeable to some recent authors who maintain *Pulsatilla* yet suppress *Sieversia.*

I here enumerate only such species as have been attributed to North America.

S. PENTAPETALA. *Dryas pentapetala*, Linn. Amœn. ii. 353 (1750), and Sp. Pl. i. 501 (1753). *Dryas anemonoides*, Pallas, Reise, iii. App. n. 92. t. xxviii. fig. 2 (1776). *Anemone pusilla*, Gærtn. Com. Petrop. xiv. 543, t. xix. fig. 2, 3, vide Pallas. l. c. *Caryophyllata Camtschatica*, Lam. Encyl. i. 395 (1783). *Geum anemonoides*, Willd. Sp. Pl. ii. 1117 (1799). *Sieversia anemonoides*, Willd. Berl. Mag. v. 397 (1811). Originally from Kamtschatka, the species was credited by Pursh to our "Northwest Coast and the Kurile Islands," apparently on the authority of specimens in Lambert's herbarium obtained from Pallas. But Gray, in the *Flora of North America*, after having seen the specimens cited by Pursh, quotes Pallas' labels thus: "Islands towards the coast of America," and "Unalaska"; but the actual occurrence of this plant either on or near the American Continent seems to need verification.

I quite sympathize with those authors who have dropped the earliest specific name *pentapetala* in favor of the second one, *anemonoides*; for the earlier, given under *Dryas*, when it was very fitting, is absurd in a genus where all the species are pentapetalous. But these are days in which it seems uselesss to attempt to resist the tide of feeling for strict priority.

S. GLACIALIS, R. Br. l. c. (1824). *Geum glaciale*, Fisch. in Mem. Soc. Mosc. ii. 187, t. xi, fig. 20 (1809). Also an Asiatic species, but one whose occurrence in arctic or subarctic America is well authenticated.

S. ROSSII, R. Br. l. c. (1824). *Geum Rossii*, Seringe, in DC. Prodr. ii. 553 (1825). Species exclusively North American and subarctic; but the two following have been confused with it.

S. TURBINATA. *Geum turbinatum*, Rydb. Bull. Torr. Club. xxiv. 91 (1897). Inhabiting the Rocky Mountains from Arizona and New Mexico northward.

S. SERICEA. *Geum sericeum*, Greene, Pitt. iii. 172 (1897). From the Ruby Mountains, Nevada, to Montana.

These three species, *S. Rossii, turbinata* and *sericea*, while at agreement with the generic type in point of habit, and in the continuity and persistency of the styles, fail to show the plumose characters in this organ. They may be compared to such species of *Clematis* as *C. Pitcheri* and *crispa*, in which the feathery hairiness of the styles also fails; but no one doubts their title to membership in the genus *Clematis*.

S. ROTUNDIFOLIA, Ch. & Schl. in Linnæa, ii. 4 (1827). *Geum rotundifolium*, Langsd. in DC. Prodr. ii. 15 (1825). Here we have a northwestern and insular *Sieversia* with foliage more like that of *Geum*; but the styles are continuous, and also distinctly though rather lightly feathery.

S. CILIATA, G. Don, Gen. Hist. ii. 528 (1832), also *S. triflora* of the same. *Geum ciliatum*, Pursh, Fl. i. 352 (1814), also *G. triflorum* of the same, ii. 736. Our most common species, extending across the continent northward along the boundary between the United States and British America; in the western mountain districts and high prairie regions occurring as far south as Missouri and Arizona; if Pursh's *G. ciliatum* and *triflorum* be one and the same species; which there may be reason for doubting.

VANCLEVEA.

Low tufted desert shrub, with the habit of certain species of *Chrysothamnus*, nearly; but bracts of the turbinate involucre wholly herbaceous, and very gummy as in *Grindelia*. Rays none. Disk-corollas claviform, with 5 short

erect teeth. Styles elongated, their tips long, subterete, papillose-puberulent as in Eupatoriaceous plants. Achenes apparently prismatic, villous-hirsute, surmounted by a persistent-pappus of about 12 chartaceous narrowly linear very acute paleæ, their margins delicately ciliolate.

The genus is dedicated to the memory of Mr. J. W. Van Cleve, resident of Dayton, Ohio, in the days of Short, Peter, Riddell and Houghton, and a co-laborer with them in the field of western Botany.

V. STYLOSA. *Grindelia stylosa*, Eastwood, in Proc. Calif. Acad. 2 ser. vi. 293 (1896). Inhabitant of sandy desert wastes in southeastern Utah; and perhaps the sole specific representative of its genus.

Two New Gerardias.

With Plates IX and X.

G. DECEMLOBA. Very slender stem about a foot high, simple to the middle, thence bearing a few pairs of short simple racemose branches: leaves scarcely a half-inch long, setaceous-filiform, acute, scaberulous, ascending or suberect on the lower part of the stem, those subtending the few branches more spreading: pedicels about ¾ inch long, ascending, stoutish and firm for a plant so slender: calyx with venulose tube and short stout teeth: corolla bright pink, less than ½ inch long, more than ½ inch broad, the lobes all spreading and obcordate.

Plant not uncommon about Brookland, D. C., inhabiting grassy knolls and hillsides bordering on pine woods; flowering in October. The striking peculiarity of the species is the obcordate character of the primary divisions of the corolla, giving this organ the appearance of being ten-lobed.

G. Holmiana. Commonly 1½ feet high and loosely paniculate from near the base: leaves about an inch long and spreading, very narrowly linear, acute, only very minutely roughened: pedicels filiform, about an inch long: calyx-teeth very short: corolla deep rose-purple, ¾ inch broad and nearly as long, the lobes all spreading, broader than long, truncate or retuse, villous-ciliate: the longer filaments very villous, as also the throat of the corolla behind them; anthers with prominent incurved mucro.

Plentiful in open pine and oak groves along Michigan Avenue south of the Soldiers' Home grounds near Brookland, D. C., collected by Mr. Holm and the writer, 20 Oct., 1898. Possibly heretofore confused with *G. tenuifolia*, from which it differs very strikingly in that all its corolla-lobes are spreading and subequal. In *G. tenuifolia* (which is a much smaller plant) in all its forms, the two upper lobes of the corolla are erect, and galeately arched over the stamens, while the others are larger and spreading. This excellent species I dedicate to my friend Mr. Theodor Holm of Brookland, D. C., not merely out of compliment; for the detection of the characters of both these species as distinct and probably new, was the result of his own study of them in the field; and the excellent plates accompanying this paper are from his drawings.

GERARDIA DECEMLOBA, Greene.

GERARDIA HOLMIANA, Greene.

Vol. IV. Part 21.

PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Professor of Botany in the Catholic University of America,

WASHINGTON, D. C.

JULY—DECEMBER, 1899.

CONTENTS.

	Page
A Decade of New Gutierrezias,	53
Some Western Species of Xanthium,	58
Four New Violets,	64
New or Noteworthy Species XXV,	68
Segregates of Caltha Leptosepala,	73
New Species of Antennaria,	81
West American Asperifoliæ—IV,	86
New or Noteworthy Species, XXVI, (Plate xi.)	98

Price, Fifty Cents

Payot, Upham & Co., *San Francisco*: William Wesley & Son, *London.*

A Decade of New Gutierrezias.

Representatives of the genus *Gutierrezia* are abundant on all elevated plains and arid mountain slopes from Texas to the Dakotas, and westward to the Pacific; but the critical study of them has never been taken up at all seriously since the time of Nuttall and the elder De Candolle. It is easy to say that twenty or thirty seeming species, gathered out of as many different and often widely separated climatic regions, are all but so many modifications of "*Gutierrezia Euthamiæ*," much easier than it is to carefully work out their specific characters. But the more difficult alternative is the only one that gives promise of results satisfactory to the travelled and observant student.

The following are some of the species which I am able to make out from material existing in my own herbarium, collected largely by myself during many years of field work in the West.

G. diversifolia. Stems 4 to 8 inches high, loosely rather than densely tufted on a short stout ligneous crown of the root, angled and scabrous but hardly glutinous: lowest leaves somewhat oblanceolate, the short blade tapering to a long winged and hispid-ciliolate petiole, this again gradually widening to the base; only the uppermost truly linear and these not narrowly so: inflorescence of large and rather broadly turbinate involucres formed into an open more or less dichotomous and not flat-topped cyme: bracts of the involucre in only about 3 series, with thick obtuse green tips: rays 5 or 6, disk-flowers 8 or 10: pappus-paleæ in the disk-flowers 8 to 12, very narrow and acute, those of the disk (as is usual in the genus) less than half as long.

Frequent from Middle and North Parks in the mountains of Colorado, to Montana and westward into Utah. The description is drawn from my own specimens obtained at various times near Laramie, Wyoming. Mr. Watson's n. 551, from Parley's Park, Utah, July, 1869, is of this species, according to the sheet retained in the U. S. Herbarium, where also is a sheet collected by Marcus Jones, at Cottrell's Ranch, Utah, 21 July, 1894.

G. LONGIFOLIA. Shrubby at base, the leafy and floriferous branches of the season nearly two feet high; older stems terete, the newer striate and somewhat angled, devoid of even a scabrous pubescence, or nearly so: leaves linear, 2 inches long or more, 1-nerved: heads sessile and glomerate at the ends of fastigiate branchlets and forming a broad nearly flat-topped inflorescence; involucres elongated, obovate-turbinate, 2½ lines high, their bracts long, with thick short green tips: flowers of ray and disk each 4 or 5; pappus-paleæ of about the same number, mostly lanceolate, those of the ray shorter.

Collected in the White Mountains of New Mexico, Aug., 1897, by Mr. E. O. Wooton, and distributed as *G. microcephala* (n. 377 of my set). The heads are notably long, narrow and few-flowered; but the plant is very large, perhaps the largest of its genus, and very unlike all others in aspect, its long foliage giving it much the appearance of *Gymnosperma corymbosum.*

G. GLOMERELLA. Tufted stems 2 feet high, not slender, fastigiately corymbose, the branches of the season striate, glabrous; narrowly linear leaves ascending, scaberulous, punctate, the ultimate twigs of the inflorescence and the involucres very glutinous, the latter mostly sessile in glomerules of 3 to 5, nearly cylindric, with only 1 ray and 1 disk-flower, the bracts few, obtuse, scarcely green-tipped; the ray-flower half-enfolded by its involucral bract.

This is Mr. Wooton's n. 449, from the Organ Mountains, New Mexico, distributed, with my approval, as *G. lucida;* but this was too hastily done. The plant has, indeed, the subcylindric 2-flowered involucres of the Californian species; but it has not the yellow-green somewhat shining herbage which suggested the specific name *lucida;* nor is it glabrous; and its foliage is ascending on the stems, while that of *G. lucida* is deflexed.

G. FILIFOLIA. Size and habit of the last, but herbage dark-green and hirtellous-scabrous, the leaves ascending, linear-filiform, nearly 2 inches long; heads in a rather loose panicle, a few sessile, but most of them on short filiform pedicels: involucres narrowly obovoid, the long inner bracts obtuse and merely green-apiculate, the outer and shorter with thick green tips: flowers of ray and disk 3 or 4 each, or those of the disk sometimes 2 only, the rays long for the genus.

White Mountains of New Mexico, 24 August, 1897, at an altitude of about 5,000 feet, on what is called Round Mountain, collected by E. O. Wooton; apparently not distributed, my sheet of specimens having no number attached. By the number of flowers to the head this would be at agreement with *G. microcephala*, which, however, is a Mexican species quite different from this in important points.

G. TENUIS. Shrubby below the middle, the whole tuft of slender stems nearly two feet high, the leaves and twigs sparsely scaberulous; branchlets of the fastigiate-corymbose inflorescence very slender: leaves all narrowly linear and plane, scarcely more than ½ line wide: heads mostly pedicellate, or the terminal ones sessile in pairs or threes; involucres obovoid, 1½ lines high, their bracts in three series, the inner broad and very obtuse, inclined to be scarious-margined at summit rather than green-tipped, but the short outer ones less obtuse and with erect green tips: ray-flowers

about 4, those of the disk about 6; achenes with only a few hairs; pappus of about ten paleæ, the greater part of them somewhat lanceolate, or oblanceolate, the others narrower and shorter.

Foothills of the mountains back of Silver City, New Mexico, collected by the writer Sept. 30, 1880.

G. FASCICULATA. Size of the last, but less slender, the stem and leaves still more sparingly scaberulous, somewhat granular and quite viscid, the leaves few and widely spreading, the axils bearing short very leafy branchlets mostly sterile, but some monocephalous: inflorescence somewhat dichotomously cymose-panicled: involucres oblong-clavate, 2 lines high, their bracts in about 4 series, all except the broad innermost ones with erect and stout green-herbaceous tips: flowers of disk and ray about five each; achenes somewhat silky, and pappus of lanceolate paleæ only fewer in the ray, nearly as long as those of the disk.

Collected at Grand Junction, Colorado, 26 Aug., 1896. The flowers are all of a notably pale color for this genus.

G. JUNCEA. Very slender densely tufted stems erect from a much branched woody base, destitute of leaves at flowering time, bearing above the middle numerous fastigiate almost filiform reedy branchlets each ending in a glomerule of about 3 sessile heads, the branchlets sharply angular and hirtellous-scabrous, clothed with scattered short and spreading leafy bracts: involucres oblong-obovoid, less than 2 lines high, their narrow bracts with acutish green tips: flowers of ray and disk each 4 or 5: pappus-paleæ lanceolate, acute.

Obtained near Gray, New Mexico, in August, 1898, by Miss Skehan; and also collected on Eagle Chief Creek, Oklahoma, 12 Oct., 1896, by L. F. Ward, whose specimens are in the U. S. Herbarium. The species of quite peculiar aspect, the leaves having mostly fallen at flowering time, the bushy tufts of naked reedy stems bearing only a few bracts on the filiform twigs of the flat-topped inflorescence.

G. LEPIDOTA. Loosely tufted on a woody base, the leafy and floriferous stems 1½ feet high, smooth and glabrous, the rather large heads loosely cymose-panicled: lower leaves narrowly oblanceolate, obtuse, the upper successively narrower and those under the panicle linear, all ascending, only their margins scabrous, the surface marked with large dots each bordered with a hyaline scale, otherwise glabrous: the very distinctly turbinate involucres about 3 lines high, their bracts in about 4 series, all with thick blunt green tips: flowers of ray and disk each 6 or 7, light-yellow: paleæ of the pappus all lanceolate, acute.

Plains about Grand Junction, Colorado, 27 Aug., 1899, collected by the writer. Species very distinct by its scurfy indument and large turbinate involucres; as also by the character of its leaf-outline.

G. SEROTINA. Low slender rather diffusely panicled stems tufted on a short erect ligneous base, the whole less than a foot high: the slender angular branchlets and very narrow linear spreading foliage dark green, only very sparingly scaberulous, the leaves somewhat punctate: the numerous heads mostly solitary at the ends of short filiform branchlets: involucres barely 1½ lines high, roundish and subcampanulate, the few bracts broad and obtuse, not very notably green-tipped: flowers of the ray about 5, of the disk almost twice as many: paleæ of the pappus oblong and obtuse in the ray, oblong-lanceolate and either obtuse or acute in the disk.

Plains about Tucson in southern Arizona, beginning to flower late in autumn and continuing through the winter; excellent specimens in fruit, and with some heads still in the flowering state, were collected by Prof. Toumey, 3 March, 1892, and distributed for *G. sphærocephala;* a species which has, like this, a lax inflorescence of nearly spherical heads. But that is an annual, while *G. serotina* is strictly suffrutescent like most others.

G. DIVERGENS. Notably suffrutescent, 2 feet high or more, glabrous or merely granular-scaberulous, never truly scabrous, the panicled rather than corymbose branches nearly destitute of foliage at flowering time: involucres $\frac{1}{4}$ inch high, obovate-turbinate, their obovate obtuse bracts well imbricated and with blunt green tips: disk-flowers 5 to 7, those of the ray about 5: paleæ of the pappus 9 to 12, very unequal, all narrow and acute, the more numerous short ones sometimes conjoined at base with the longer ones, so that these appear trifid, *i. e.*, as having short lateral segments.

This is the most common species of the genus in southern California, and is excellently represented by Mr. Parish's specimens distributed from the San Bernardino mesas; and also, under no 2241, from near Fall Brook, San Diego County. In a more slender and less glabrous form, with smaller involucres and comparatively narrow bracts, it occurs in the herbaria from Mission Valley, San Diego, collected by Mr. Orcutt. In the Botany of the Californian State Survey Dr. Gray guessed the plant to be Lagasca's *G. linearifolia;* and in the Synoptical Flora he erred about as widely in referring it to *G. Californica*, a species everywhere marked by its few and very large heads, these variously scattered or glomerate. In the present species they are panicled as in no other North American *Gutierrezia.*

Some Western Species of Xanthium.

Having long desired to attempt a segregation of our American species of this genus, I have thus far been deterred by the seeming impossibility of identifying the older species. Even those of the Old World are wretchedly confused by Linnæus; both his *X. strumarium* and *X. orientale* are aggregates, and several plants from both hemispheres are included by him in each. *X. orientale*, in spite of its name, has a

Virginian plant for its type, if the species can be said to have, with Linnæus, any type at all. Miller's *X. Canadense* is perhaps as complex; but, as he defines no species at all, the name might well be treated as a *nomen nudum*; and especially in view of what, to me, is manifest, that it has been applied by different botanists to perhaps not less than a dozen distinct North American species. The *X. Americanum* of Walter and *X. maculatum* of Rafinesque are equally indeterminable, insomuch that the elder De Candolle, to get rid of so bad a lot, proposed a new name *X. macrocarpum* var. *glabratum* to cover all the North American members of this group known to him. In a monograph by Wallroth, published in 1842, that author seems to have found the difficulties with the older North American species altogether insurmountable. He therefore rejects all the older names, assigning new ones to the five species which he makes out as belonging to our country. The identification of these will devolve upon him who shall undertake to disentangle eastern and southern Xanthia. At present I know nothing as to what his *X. lævigatum, pungens, Pennsylvanicum, xanthocarpum* or *oviforme* are. Presumably, however, they all belong to the Atlantic slope of the continent. Little or nothing was known of this genus as represented west of the Mississippi in the year 1842. As all the following are from far-western regions, I shall, in naming them as new, incur small risk of becoming a manufacturer of synonyms.

X. VARIANS. Upright, simple or sparingly branched, fructiferous in all the axils almost from the base: stem very sparsely and minutely setose-hispid: leaves varying from lanceolate and serrate in the lowest to rhombic-ovate and broadly ovate-trigonous in the upper, these not lobed but doubly serrate-dentate, all tapering (though some abruptly) to the petiole, both surfaces scabrous: fruiting involucres oval, 8 to 10 lines long, densely prickly, the prickles half as long as the diameter of the body, slender conical, brownish-

hirsute to the middle, the body of the involucre with a few short stiff dark prickles beneath the main ones: beaks stout, short-hispid up to the very short incurved tips.

Sandy banks of the Columbia River, Klickitat Co., Washington, Oct., 1893, W. N. Suksdorf, n. 1583, distributed as *X. strumarium.* Remarkable for the variability of its foliage.

X. AFFINE. Size of the preceding, the inflorescence equally scattered, the sparse roughness of the stem strigose: leaves variable but all more or less distinctly deltoid, none lanceolate or rhombic, the uppermost broadly ovate-trigonous with truncate or subcordate base, though abruptly narrowed to the petiole, all doubly dentate, but none lobed, the surface sparsely strigulose-scabrous and minutely resinous-dotted: fruiting involucres 8 lines long, narrower than in the last, with only about half as many uncinate prickles, these more slender, far less hirsute, the body of the involucre between them bearing rather many short black truncated or gland-tipped aculeæ; beaks more slender, less hispid and with longer incurved tips.

Habitat of the preceding species, and by the same collector, distributed without a specific name, under n. 1584. Distinguished from *X. varium* by the appressed hairs of the stem and very different fruit.

X. SILPHIIFOLIUM. Stem stout and tall, glabrous and purple-dotted below, strigulose towards the summit: large leaves from lanceolate-deltoid to deltoid-ovate, 4 to 8 inches long including the petiole, not at all lobed, but very evenly coarsely and doubly dentate or serrate-dentate, the base either almost truncate or abruptly tapering to the petiole, the surface sparsely muricate-scabrous and resin-dotted: fruiting involucres oval, 1 inch long or more, densely echinate with long prickles which are strongly and retrorsely hirsute, especially dorsally, up to the long naked horny tip, this somewhat doubly (or circinately) uncinate and fish-

hook-like; beaks conspicuously longer than the prickles, more shortly hirsute, strongly incurved at apex.

The type of this strongly marked species is of Mr. Suksdorf's collecting from the banks of the Columbia, Sept., 1883, the specimen preserved in the U. S. Herbarium. Another specimen, with broader and less elongated foliage, is Sandberg and Leiberg's n. 446 from Rock Island, Kittitas Co., Washington, July, 1893.

X. GLANDULIFERUM. Rather slender, purple-stemmed, the upper part of the stem strigose-hispidulous: leaves rather small, long-petioled, not at all lobed, all of deltoid-ovate outline, broadly cuneate and entire at base, doubly dentate from below the middle to the apex, strigose-hispid along the veins, the surface rather strongly strigose-scabrous: fruiting involucres oblong-ovoid, ¾ inch long, rather loosely echinate with shortish prickles, these with some whitish hirsute hairs and many shorter gland-tipped ones, the body of the fruit also bearing many sessile or subsessile resin-glands; beaks slender-conical, white-hispid, divergent, incurved at tip.

Collected at Walsh, Assiniboia, 15 Aug., 1895, by Mr. John Macoun, and distributed for *X. Canadense*, but the species evidently new, and thoroughly distinct. The ticket accompanying my specimen bears the Canadian Survey number 10,910.

X. CAMPESTRE. Stout flexuous branched stems strongly angular, marked with short purple lines and sparsely scabrous, the upper portion hispidulous: leaves of irregularly ovate-trigonous outline, not lobed, coarsely subsinuate-toothed and saliently dentate, the surface strongly muricate-scabrous: fruiting involucres narrow-ovoid, 1 inch long or more, densely echinate with long prickles which are rather shortly and sparsely ferruginous-hispid up to the middle, and with some sessile glands; beaks notably longer than the prickles, very stout and hispid, their tips little incurved.

Fertile plains of the Sacramento River, in middle and northern California; the best specimens collected by myself, near Chico, June, 1890; but there exists in the U. S. Herbarium a good one from the Wilkes Expedition obtained near Sacramento.

X. CALIFORNICUM. Stout and freely branching, the stem scabro-hispidulous and the leaf-surface very rough with short sharp strigulose hairs, the veins bearing some that are longer and strigose: leaf-outline broadly and angularly ovate, the margins unevenly double-dentate: fruiting involucres many and densely clustered in the axils, oblong-ovoid, about an inch long, pubescent and somewhat glandular between the only moderately crowded prickles, these rather short and stout, sparsely white-hispid toward the base, otherwise naked; beaks a little longer than the prickles, stout, hispidulous and glandular, somewhat incurved from the base and also hooked.

Common in middle California, especially about San Francisco Bay, being the *X. Canadense* of my *Manual* and of the *Flora Franciscana* in large part.

X. ACUTUM. Stems naked and purple-streaked below, hispidulous above: leaves obscurely and inequilaterally ovate-trigonous, nearly truncate at base, very acute or almost acuminate at apex, unevenly serrate-toothed on the margin, hispidulous-scabrous and with copious small resin dots among the hairs: fruiting involucres racemose or subumbellate in the axils on a peduncle an inch long, with also a sessile one at base of the peduncle, or the uppermost all sessile and glomerate, each involucre about $\frac{3}{4}$ inch long, oblong, rather sparsely echinate, both the body of the involucre and its prickles toward the base invested with sessile resin glands and a few short white hairs; beaks little exceeding the prickles, straightish and little divergent, glandular and white-hispidulous.

Known by a single specimen obtained at Stockton, California, by Mr. J. A. Sanford, in 1888.

X. PALUSTRE. Erect, rather slender and simple, 2 or 3 feet high, the stem green and glabrous, only scabrous above: strongly muricate-scabrous leaves, of broadly ovate outline, often indistinctly 3-lobed, the blade abruptly tapering to the long slender petiole, obtuse at apex, the margin coarsely dentate: fruiting involucres axillary and sessile in twos or threes, slightly obovate-oblong, densely echinate with remarkably short prickles, these hispid at base, and the body of the involucre either naked, or hispid with more or less numerous stout gland-tipped hairs; beaks short and stout, hispidulous, and with very short inflexed tip.

Known only from the brackish marshes of Suisun Bay, middle California. An exceedingly well marked species, referred to by me as an indigenous state of *X. Canadense* in the *Flora Franciscana.*

X. ACEROSUM. Stems very stout and flexuous, strongly scabrous above: leaves broadly and subcordately ovate, obtuse, crenate-dentate, very scabrous and with rather copious minute resin dots: fruiting involucres about 2 in each axil, one of them pedunculate or both subsessile, about 1¼ inches long, very densely prickly, the prickles long and slender, hirsute or hispid to near the summit and with copious short-stalked resin-glands intermixed with the hairs, the naked spinescent apex in about half of them perfectly straight and acerose, in the rest more or less curved or hooked; beaks slender-conical, little divergent, hispid up to the short strongly incurved tips.

Known only from the valley of the Red River of the North, where it was collected by the writer, near Fargo, North Dakota, 4 Sept., 1893.

Four New Violets.

All these proposed new species of *Viola* are of the acaulescent purple-flowered group. All except one have been known to me more or less imperfectly since 1897, and have been referred to one and another published species; but their distinctive peculiarities have now this year been strongly forced upon me by seeing them in flower alongside those with which I had confused them.

V. pratincola. Rootstocks mostly elongated and ascending, stout and knotted, herbage wholly glabrous and rather light-green: early leaves reniform-cordate, evenly and closely crenate, those of summer of similar outline but 2½ to 4 inches wide, cuspidately acuminate, commonly much broader than long, therefore cordate-reniform: peduncles of petaliferous early flowers, stout, elongated, bearing the flowers mostly above the leaves, terete, though with a narrow groove up and down the upper side; bractlets very short, broadly triangular-subulate, inserted at or below midway of the peduncle: sepals oblong-lanceolate, obtuse, nerveless, or the uppermost one 3-nerved, all with short nearly truncate entire auricles: corolla ¾ inch broad, light-blue, all the petals broad and rounded, white at base, the lower pronouncedly purple-veined, the laterals strongly bearded at base with long white hairs mostly terete and cylindric but some abruptly clavellate-dilated at tip: apetalous flowers of summer mostly or altogether hypogeous.

I collected this plant in its summer condition, on the first of July, 1898, in a low meadow of natural vegetation (the land never having been ploughed) near the banks of the Des Moines River, at Windom, Minnesota. It was growing in great abundance in the rich black prairie soil among grasses and lilies (*Lilium umbellatum*). Copious living specimens

of the plant in full vernal flower were sent me this season, from the same spot, by my niece, Miss Nellie C. Greene, so that I have now all needful data from which to determine its rank. Of its distribution I know little; but it may safely be inferred that it is common in low prairies of at least southern Minnesota, northern Iowa, and parts adjacent.

It is to be observed that in *V. pratincola*, as in perhaps not a few of the more northerly acaulescent violets, capsules and seeds are produced freely from the early and petaliferous flowers, these, of course, being borne on peduncles that are erect in maturity as at flowering time; but still, the greater proportion of seeds is produced from the later more or less subterranean and horizontal peduncles.

V. Dicksonii. Allied to *V. cuspidata*, but the herbage light-green, the pubescence more sparse and hispidulous, the petaliferous flowers on nearly terete peduncles about equalling the leaves and bibracteolate near the base: sepals lanceolate, either naked or ciliolate: corolla about ¾ inch long, of a fine lavender-blue, the paired petals, especially the two uppermost, obovate-rhomboidal, the laterals white at base and strongly bearded with indistinctly clavellate hairs, the keel-petal shorter and narrower than the others, more or less conduplicate or convolute especially at apex, white at base, and purple-veined above the white: summer foliage less broad in proportion to its length than in *V. cuspidata* and more apt to be cucullate: apetalous flowers on short but nearly or altogether hypogeous peduncles.

A common Canadian violet of woods and thickets, referred by me to *V. cuspidata* when first seen in dried material; also commented upon by Mr. J. M. Macoun at page 186 of volume xii of the *Ottawa Naturalist* (Jan., 1899), under that name. But the description given is only a reprint of that of *V. cuspidata* and is now found to be very inapplicable to the plant of Canadian habitat. The plates issued by Mr. Macoun are also, most unfortunately, and through

my own fault in large part, wrong for *V. Dicksonii.* Figure 5 of plate iii, as to all but the flower, was drawn from a small Canadian specimen fresh in all except the flower; and this part of the figure was supplied from a dried corolla; although it does not at all represent the real corolla of either *V. Dicksonii* or *V. cuspidata.* But plate 6 was made from a dried specimen of true *V. cuspidata* which had been collected by myself last summer in northern Illinois. I must here do Mr. Holm the justice of stating that he, after having made the drawings for these plates, expressed the opinion that the specimen from Illinois and that from Canada were of different species; a conclusion which was forced upon myself as soon as I saw the two plants in flower side by side in my garden last May.

V. ELEGANTULA. Acaulescent and low, the whole plant at time of petaliferous flowering barely 3 inches high and the peduncles far exceeding the leaves: rounded and cordate-reniform leaves pale-green and slightly succulent, about $\frac{3}{4}$ inch wide, short-petioled and the petioles erect, the margin lightly crenate and all parts wholly glabrous: peduncles obscurely angled, bibracteolate above the middle, the bractlets subulate: sepals lance-linear, obtusish: corolla rather more than $\frac{1}{2}$ inch in length, not as broad as long; petals all similar in size and outline, oblong-obovate, obtuse or retuse, light-blue, the lower 3 with conspicuous violet veins on a white ground at base, the laterals bearing a low and thin tuft of short strongly clavate hairs, or some of them shortened to mere papillæ; 2 upper petals naked, in full expansion deflected and concealing the calyx: style elongated: late apetalous flowers small, aerial on short horizontal or recurved peduncles.

Species collected by the Messrs. Macoun, not far from Ottawa, Canada, said to inhabit low moist places in the midst of sandy fields. It seems to unite the foliage of *V. blanda* with flowers of something like *V. cucullata;* though the

characteristics of the corolla of *V. elegantula* are very striking. The petals are much longer and narrower in proportion than those of *V. cucullata*, and the uppermost pair are deflexed, instead of standing upright as in other species of the group. It is also like the *V. blanda* group in respect to its greatly elongated peduncles which support the corollas away above the foliage. It is also suggestive of *V. venustula* to a certain degree, but chiefly by its small size as compared with other members of this group. The foliage in the last named is, however, of very marked character, and its flowers are of a dark-blue, and not borne above the foliage.

V. VAGULA. Larger than the last, with dark-green glabrous rather notably fleshy herbage: leaves at time of petaliferous flowering about an inch in diameter, somewhat deltoid-cordate, the length equalling or surpassing the breadth, the margin lightly crenate: peduncles surpassing the leaves, obscurely angled or semiterete, bibracteolate in about the middle, the rather obtuse bractlets with a few obscure glandular teeth: sepals oblong, obtuse: corolla nearly an inch in diameter, the breadth commonly greater than the length; petals deep violet, at base darkly venulose on a white ground, all obovate-spatulate, obtuse or notched, the odd one especially broad and often obcordate, the pair next to it bearing each a dense tuft of rather long and slender not in the least clavellate hairs: style not prolonged beyond he anthers: apetalous summer flowers aerial, but their peduncles short and more or less horizontal; their capsules short and thick, not dotted.

Collected by Mr. J. M. Macoun, in the Ottawa district, and at first taken by him for *V. venustula*, which it resembles in some particulars, holding a place intermediate between that and *V. cucullata*, as to foliage being more like the latter.

New or Noteworthy Species.—XXIV.

Argemone squarrosa. Perennial, the stout branching and apparently decumbent branching stems 2 feet high or more, rather sparsely hispid, the spines rather slender, and unequal: leaves simply pinnatifid, the lobes in pairs, with broad sinuses between them, hispidulous on both faces, the lobes spinose-tipped: flowers, and also the fruits, sessile at the open-cymose summit of the stem: sepals very hispid with ascending spines: corolla 3 inches broad, the white petals overlapping and expanding to the rotate: capsules nearly 2 inches long, of oval-lanceolate outline, bearing numerous bract-like herbaceous recurved and spine-tipped protuberances ½ to ¾ inch long, their herbaceous basal part hispid with distinct prickles and also roughened with short coarse setose hairs, the body of the whole capsule similarly both prickly and setose-pubescent.

An exceedingly pronounced species in the characters of the capsule; this organ appearing as if covered with spinescent bracts. Its habitat is southern New Mexico, where it was collected in August, 1898, by Miss J. Skehan.

Argemone sanguinea. *A. Mexicana*, var. *rosea*, Coulter, Bot. West Texas, p. 12. The beautiful plant so named by Prof. Coulter is surely no part of *A. platyceras;* a species which is, I believe, wholly Mexican, and not known within the United States. The petals in *A. sanguinea*, so far from being rose-colored, are of a dark, almost blood red. It is to be regretted that it is not in cultivation, and that even in the herbaria it exists in only scanty and fragmentary material.

✓ Lesquerella valida. Stout decumbent flowering stems numerous, axillary to the outer leaves of a rosulate tuft, the whole with a single tap root, the stems about 5 or 6 inches high, and, with the leaves, calyx and pods silvery with a

close lepidote-stellate indument: obovate or somewhat spatulate basal leaves entire or few toothed, tapering to a petiole, the cauline oblanceolate, entire: racemes short and dense, hardly more than corymbose even in fruit: pods ovate, somewhat compressed, tipped with a style of half their own length; cells about 6-ovuled.

Collected at Gray, New Mexico, by Miss Josephine Skehan, 1898.

Aragallus Richardsonii. *Oxytropis splendens*, var. *Richardsonii*, Hook. Fl. i. 148. The *Oxytropis splendens* of Douglas was published in Hooker's Flora as including two varieties, one of which he named *vestita;* and this is Douglas' type of the species. It is distinguished readily as exhibiting an elongated spike which is very conspicuously bracted, the bracts considerably surpassing the flowers. It is less common within the borders of the United States than is that which I here raise to specific rank under the name of *A. Richardsonii.* The greater proportion of our Rocky Mountain and still more westerly so-called *Oxytropis splendens* belongs to the present species, which is characterized by much smaller flowers, forming an elongated and narrow spike, and this without the manifest bracts subtending the flowers. Bracts are indeed present, but, not equalling the calyx in length, are wholly inconspicuous.

Aragallus caudatus. Size of *A. splendens*, and with 4 to 6 leaflets in the whorl, these all elliptic-lanceolate and very acute but unequal, the largest an inch long, but others in the same whorl scarcely half as long: scapiform peduncles very hirsute, bearing a broad and short spike at the utmost only 2 inches long and of oblong outline; each flower subtended by very narrowly linear and strongly hirsute caudiform bract of an inch in length: flowers rather large, apparently rose-red (fading lilac-purple): fruit not seen.

Specimens collected at Moose Jaw, Assiniboia, 26 June, 1896, by Mr. John Macoun (Canad. Surv. n. 13,957). The

spike before expansion of the corollas is only round-oval, and appears as if it were a mere cluster of long almost filiform plumose bracts.

Solidago pruinosa. Erect, 3 feet high or more, very leafy up to the dense short pyramidal panicle of short spreading or slightly recurved abruptly ending and obtuse racemes of rather large heads: leaves ascending, 2 inches long, elliptic-lanceolate, acute or acuminate, slightly but evenly serrate from near the base to near the apex, distinctly 3-nerved and canescent or almost hoary on both faces with a dense rather soft puberulence or pubescence: pedicels and branches of the inflorescence almost tomentulose: bracts of the more than middle-sized involucre in about 3 series, the short outer ones subulate-linear, the inner long ones also visibly narrowed from base to apex but obtusish; flowers apparently light-yellow.

Collected at Moose Jaw, Assiniboia, 13 Aug., 1895, by Mr. John Macoun, and numbered 10,893 and 10,894 in the Canadian Survey Herbarium. An uncommonly good species of the section to which *S. Canadensis* belongs, but with the indument of such species as *S. Californica* and *S. nana*, no approach to which is made in any eastern or southern forms of the *S. Canadensis* group.

Eucephalus Macounii. Tall and amply leafy but rather slender, sparsely but rather roughly puberulent: lower leaves oblong-lanceolate, 3 inches long, the upper oblong, sessile by a broad half-clasping base, all acute and remotely but very sharply serrate: heads few and corymbose, about ½ inch high; involucres broadly turbinate, their bracts in about 4 series, all lanceolate, very acute, purplish and stiffly ciliolate marginally, but pubescent on the back and very herbaceous for the genus: rays 10 to 15, narrow, violet: achenes pubescent; pappus-bristles rather slender and soft, but the longer ones dilated upwards.

Vicinity of Victoria, Vancouver Island, July, 1893, col-

lected by Mr. John Macoun, no. 447; distributed for *Aster radulinus*, and later referred by me to *Eucephalus Engelmannii*, from which its pubescence, serrated foliage and narrow pubescent involucral bracts completely distinguish it.

MACHÆRANTHERA TAGETINA. Related to *M. tanacetifolia*, of similar habit, the root doubtless annual: herbage roughish with a short spreading pubescence, some of the hairs gland-tipped: leaves consisting of an oblanceolate long terminal lobe and two or more pairs of remote linear short pinnules below it, the reduced ones of the branchlets smaller and with less inequality between the terminal and lateral lobes: heads about half as large as in *M. tanacetifolia*, the involucres turbinate, their bracts in about 3 series, closely imbricated and wholly erect, the linear white-chartaceous lower part much longer than the subulate-linear erect and hardly acute green tips: rays few (12 to 15); achenes (immature) densely silky-villous.

Of this species, remarkably distinct from all others known in character of foliage and involucre, only a flowering branch apparently broken off from what may have been a large plant, is preserved in the U. S. Herbarium. It was collected by T. E. Wilcox in 1891, at some unrecorded station in Arizona.

MACHÆRANTHERA COMMIXTA. Stems 6 inches high more or less, apparently from a perennial root, reddish and glabrous below, hirtellous-scabrous above: leaves large for the plant, spatulate, serrate, 3-nerved: involucres several in a terminal corymb, large, campanulate, their bracts in 3 or 4 series, broad, with triangular-subulate viscid-granular spreading green tips: rays many, large and showy.

From the Henry Mountains, Utah, 1894, by Marcus Jones; the specimen preserved in the U. S. Herbarium, mounted with specimens of the next. It might be referred to the Colorado *M. Pattersonii* but for the conspicuously 3-nerved leaves and the characteristie involucre of broad short-tipped bracts.

Machæranthera mucronata. Low cæspitose perennial, rather smaller than *M. Pattersonii*, far more slender, but heads as large: leaves mainly basal in tufts, oblanceolate, entire, petiolate, at apex cuspidately mucronate, nearly glabrous on both faces, but margins finely ciliolate, and the petioles ciliate: scapiform peduncles decumbent, slender, 3 to 6 inches high, bearing 1 to 3 large campanulate involucres, their narrow bracts in 3 or 4 series, with long subulate-attenuate thin-herbaceous hispidulous spreading tips of purple color: rays many and showy: achenes glabrous.

Rather copious specimens of this are in the U. S. Herbarium, all from Mr. Jones, and collected in Arizona in 1894, at two stations, designated as Thompson Cañon, and the Buckskin Mountains.

Bidens vulgatus. Coarse and stout somewhat fastigiately branched annual commonly 3 to 6 feet high, obscurely pubescent or almost glabrous: largest leaves 6 to 10 inches long, divided into 5 lanceolate incisely serrate abruptly acuminate divisions all petiolulate leaflets, the two lower cut at base into one or more secondary leaflets: fruiting heads few and very large, terminating the somewhat corymbose branches and branchlets, the more strictly terminal ones $\frac{3}{4}$ inch high and $1\frac{1}{2}$ inches broad; leafy outer bracts of involucre surpassing the head, their petiolar base ciliate: rays few and inconspicuous: achenes thickish on the margin, more or less pubescent, the outer yellowish-green, sparsely tuberculate on the back.

One of the commonest and most annoying of autumnal field and wayside weeds throughout the Eastern and Middle U. S., and one which has heretofore passed for *B. frondosus;* perhaps supposed to be the type of that species. But the real *B. frondosus* of Linnæus, equally common, is a more slender plant, more widely branching, with heads hardly half as large, whose best specific character may be its narrower slenderly, or even caudately, acuminate leaflets.

Segregates of Caltha Leptosepala.

During almost thirty years I have been acquiring familiarity in field and herbarium with the white-flowered *Caltha* species common in alpine or subalpine districts of our far-western mountains, from New Mexico to Montana and from middle California to Alaska, all of which have until now been referred partly to *C. biflora* and partly to *C. leptosepala*; or else, as by all our botanists not long ago, even *C. biflora* itself, and all the rest were called forms of *C. leptosepala.*

The species last named was founded on specimens derived from the seaboard of subarctic North America, a country as different climatologically and phytologically as Iceland is different from the mountain districts of Italy and Spain.

I have never yet had the good fortune to visit those high-northern shores which are the habitat of the genuine *C. leptosepala*, and so have never seen it growing; but it has for some years been evident to me, from the herbarium specimens, that nothing answering to the diagnosis of *C. leptosepala* is found within the limits of the United States, or even near our borders; for all our southerly and alpine specimens are most strictly acaulescent, their flowers, though numerous, all being solitary, terminating axillary scapes, whereas, in the far-northwestern plants each individual displays but a single apparently terminal leaf-bearing stem with two flowers, one of which is properly terminal, the other axillary to the solitary leaf. Moreover, while the far-northern plants exhibit filiform filaments, our mountain species, at least some of them, have short and more or less flattened filaments. When one has detected such strong differential characters as these which I have thus indicated, it is no longer possible to regard all these things as variations of

Caltha leptosepala; and I suggest the following tentative classification of the species:

* *Caulescent; or the peduncle solitary, terminal (apparently), leaf-bearing, usually 2-flowered.*

C. BIFLORA, DC. Syst. i. 310? Leaves numerous, long-petioled, erect, appendaged at base by very conspicuous broad obtuse dark-brown sheathing stipules, the blade round-reniform, the broad rounded basal lobes overlapping and closing the sinus, the margin evenly crenulate, in width 1½ to 3 inches, the length considerably less: cauline leaf like the others but smaller and short petiolate, inserted below the middle, with a broad clasping stipule, and forming a very obvious node, the two peduncles very unequal: sepals oblong or obovate-oblong, obtuse: filaments filiform, four times the length of the linear anthers.

This diagnosis is made, independently of the original Candollean description of *C. biflora*, from specimens collected on moist mountain slopes at Bailey Bay, Alaska, 14 June, 1894, by Mr. M. W. Gorman, of Portland, Oregon. The specimens are beautiful ones, and two sheets of them are known to me, one being in the herbarium of the Catholic University, the other in the National Museum. It is probably the real *C. biflora*, DC., though certainty can scarcely be hoped for until the originals, supposed to have been preserved in the Banksian herbarium, have been examined. At one point our specimens fail to answer the requirements of De Candolle's diagnosis; the leaves in our plant are not "reniform, cordate at base, with a very broad sinus." They are more near to the orbicular than to the reniform, and the sinuses are closed. I accept, though with much reluctance, the explanation of the late Dr. Huth, that as in the dried specimens the basal lobes are often folded upwards over the body of the leaf and pressed closely down so as to be half invisible, so De Candolle was misled as to the existence of a broad open sinus where, in the fresh plant,

there was no sinus at all but a closed one.[1] The apology is a lame one, indeed; for, if Dr. Huth and I could see that the broad sinus was artificially or accidentally made in the process of drying, why should not such keen eyes as were those of De Candolle have detected this? Nevertheless, upon no other supposition can this Alaskan plant of mine be accepted as representing *C. biflora;* and so I assign the name with a mark of doubt. At same time, if this be not that species, then none of our white-flowered Calthas can be.

And I here offer willingly a suggestion that has lately been made to me in a letter, by the most experienced of all botanists in the flora of far-northern and northwestern America, Mr. John Macoun. This friend has failed to find any plant in any of his many expeditions to the Northwest, or in any of the numerous collections made there by others, which he can confidently receive as answering to the description of *C. biflora* in the important points of the foliage. But he finds plants of the yellow-flowered *C. palustris* group which are not only strictly two-flowered, but which have precisely the foliage, basal and cauline, ascribed to *C. biflora.*

Now against the accepting of this view, that *C. biflora* is a simple-stemmed two-flowered yellow *Caltha* with reniform leaves showing a broad open sinus—as seen in many subarctic specimens—against this lies the fact all the yellow-flowered plants have five obovate sepals instead of the ten oblong ones which are, by distinct implication, attributed to *C. biflora.*

Otherwise, it must still be admitted that, in the absence of any white-flowered *Caltha* answering the requirements of *C. biflora* as to foliage, Mr. Macoun's suggestion is a valuable one. But the Alaskan plant here somewhat hypothetically taken for real *C. biflora* Mr. Macoun has not seen.

C. MALVACEA. *C. biflora*, Torr. Bot., Wilkes Exp. 215, not of DC. nor Hook. Habit, stem and geminate peduncles as

---

[1] HELIOS, ix, 68.

in the last, but herbage light-green (as in *C. palustris*), the leaves orbicular, 2½ to 4 inches broad, 2 to 3 inches long, the sinus narrow or closed, the margins rather coarsely and deeply crenate, the petioles (in mature plant) 6 to 8 inches long, with obtuse but very short stipules; cauline leaf nearly semiorbicular, 2 inches broad, on a petiole of 1 inch, inserted above midway of the stem and with broad clasping stipule: sepals apparently only 6 or 7; filaments filiform: carpels distinctly stipitate, the stipe gibbous at base by a rather notable protuberance.

An exceedingly well marked species, known to me in only two specimens, both in the U. S. Herbarium, one of them (in flower) from the Wilkes Expedition collection, obtained "near the Cascades" in eastern Oregon; the other by G. R. Vasey from the mountains of eastern Washington, 1889.

As far as descriptive terminology can go, this plant might quite as well be *C. biflora* as not. But the habitat must probably exclude it from all close relation to that species; and its yellow-green herbage, and large very mallow-like foliage remove it completely from all other white-flowered Calthas. It is not certain that the plant is even subalpine. It may possibly be of wet subsaline plains "near the Cascades."

C. CONFINIS. Low and stout, with the usual deep-green herbage: basal leaves long-petioled, round-sagittiform, acutish, subentire, the sinus narrow and rather sharply angular; cauline reniform, subsessile, entire: peduncles 2, short (1 to 2 inches long), stout, divergent: sepals 5 only, broadly obovate, brownish without, milk-white within: filaments short, flattened and linear, the whole stamen shorter than the numerous pistils.

Founded on a single specimen, imperfect as to foliage, obtained in July, 1894, near the Reindeer Station at Port Clarence, Alaska, by Dr. James T. White, and deposited in the U. S. Herbarium. In this we have a two-flowered

Caltha imitating as closely as conceivable the two-flowered states of *C. palustris*, even to the broad petals limited to five in number. The leaves are almost precisely those of the Castalias in their round-sagittiform cut.

C. LEPTOSEPALA, DC. Syst. i. 310? Hook. Fl. t. x, fig. 1, doubtless. Basal leaves erect on long and rather slender petioles, round-oval, obtuse, with subcordate or subsagittate base and short rather open sinus, the margin coarsely and somewhat irregularly crenate or crenate-dentate; the cauline one smaller, more nearly truncate at base, petiolate, inserted about midway of the stem, its stipules lanceolate-subulate, not clasping, the node indistinct, the lateral peduncle shorter and more slender than the terminal one: sepals 6 to 10, oblong-linear, obtuse: filaments linear-filiform, thrice the length of the anthers, the whole stamen surpassing the rather few pistils: mature carpels substipitate.

The plant here described answers well to the original account given of *C. leptosepala*, and to Hooker's figure. But still its habitat, as far as I can read it in the herbaria, is different from that assigned by De Candolle. No such specimens are in my herbarium, nor in that of the National Museum, but there are three sheets of it in that of the Canadian Survey at Ottawa, namely, n. 1,251, from mountains south of the Zulameen River, B. C., 27 July, 1888, collected by Dawson; n. 1,252, Tsi-Tsutl Mountains, B. C., in swamps and marshy meadows, 14 July, 1896, by the same; and n. 19,246, from Maclennan River, Fraser River, B. C., 31 July, 1898. They are all British Columbian specimens, and may therefore not improbably represent the real *C. leptosepala*.

C. MACOUNII. Size of the last, but leaves smaller, on shorter and not erect petioles, more cordate at base, the sinus often closed, the margin from entire to repand-dentate or shallowly crenate: peduncles several, 1 to 4-flowered, usually with a reduced leaf inserted below midway, on a slender

petiole, but scarcely marking a distinct node, an occasional peduncle leafless and scape-like: sepals 6 to 10, oblong-linear, commonly quite unequal: filaments elongated and narrowly linear: carpels 6 to 10, rather thick, substipitate.

A beautiful species, well marked as such, though holding an intermediate place between the two groups herein outlined; only the smallest specimens presenting the solitary two-flowered peduncle; all the larger exhibiting several stems, one of which is one-flowered and bractless. The British Columbian specimens collected by Mr. Macoun are numbered as follows: n. 1,255, from along streams at 6,000 feet on Mt. Queest, 28 July, 1889; n. 1,256, obtained in alpine swamps at 5,500 feet on Mt. Arrowsmith, Vancouver Island, 17 July, 1887: and n. 1,257, collected near the snow line in the Selkirk Mountains, 20 Aug., 1885.

I also locate here a number of specimens in the U. S. Herbarium, which are from about the same geographical region within the U. S. boundaries. One from Mt. Rainier, at 6,500 feet, collected by Mr. C. V. Piper in August, 1895. There is another from Cougar Peak, Oregon, by Coville and Leiberg, 1896. This is in fruit, and all the foliage is quite entire. A third is "from beyond Florence, Idaho," L. F. Henderson. This specimen exhibits large leaves quite definitely crenate, and one stem has three flowers, with a pair of leaves subtending the peduncles. Yet another, Sandberg and Leiberg's n. 723 (1896), from Stevens' Pass in the Cascades, has four peduncles, each axillary to a bract of its own. The filaments in all these U. S. specimens, as in the more northerly ones, are so much compressed that they are linear rather than filiform.

C. CHELIDONII. Dwarf, the largest 4 inches high, others 2 or 3 inches; herbage very dark-green: leaves all round-cordate with open sinus, acutish, slightly, and for their size rather remotely, crenate, mostly less than an inch long, spreading, short-petioled, the cauline one not small, rather

long-petioled, inserted near the base of the stem or scape, its axillary peduncle short and slender, never much more than half as long as the terminal one, its stipules somewhat lunate: flower small, the oblong obtuse sepals 5 to 8: filaments linear.

Known only from Yellow Head Pass, in the Rocky Mountains of British America, where it was collected 13 July, 1898, by Mr. W. Spreadborough, who records that it grows by the margins of alpine rivulets. It is n. 19,250 of the Canadian Survey herbarium. It is not named in reference to any likeness to the celandine of modern botany; but it is most closely imitative of what was formerly known to all botanists as *Chelidonium minus*, i. e. *Ficaria ranunculoides*. As a species it is less intermediate between the two groups than is the last; for only one specimen shows a true scape, all the others having a solitary flower stem, and this bracted and forked peculiarly near the base.

* * *Acaulescent; all the flowers borne on axillary and bractless peduncles.*

C. HOWELLII. *C. biflora*, Howell, Fl. i. 20, not DC. *C. leptosepala*, var. *Howellii*, E. Huth, in Helios, ix. 68. Slender and rather flaccid, the long-petioled round-reniform leaves 2 to 3 inches broad, the rounded basal lobes mostly closing the sinus, the apex often distinctly retuse, the whole margin from entire to repand-dentate: scapes 2 or 3, often much exceeding the leaves: sepals about 10, large for the plant, variable, some oblong-linear, others in the same flower obovate-oblong, all obtuse: filaments filiform.

Common at subalpine elevations in the mountains of Oregon, thence southward to at least middle California in the Sierra Nevada. Good specimens have been distributed by Mr. Howell, from several Oregon stations, especially from the base of Mt. Hood, 1880. Mr. H. E. Brown has sent it abroad from Mt. Shasta, June, 1897. Mrs. Austin obtained and distributed large and beautiful flowering specimens

from near Colby, Butte Co., Calif., in 1896, and Mr. Sonne, from Mt. Stanford, 1890. It is in my herbarium also from Lassen's Peak, Chesnut and Drew, 1891, and also from my own collecting in the Scott Mountains, west of Mt. Shasta, Aug., 1876, these specimens being peculiar as showing a very evenly and regularly repand-dentate leaf-margin.

C. ROTUNDIFOLIA. *C. leptosepala*, var. *rotundifolia*, E. Huth, l. c. Like the last in habit and inflorescence, but herbage of much firmer texture, the leaves always longer than broad, commonly round-obovate, sometimes more elongated, the small basal lobes commonly overlapping and closing the sinus, the margin from subentire to rather unevenly dentate: scapes mostly about 3, in fruit sometimes more than a foot high, always stout: sepals large, oblong-obovate, thickish, bluish without: filaments flattened and rather broadly linear, only twice the length of the short anthers.

A most widely dispersed and variable alpine species, common from Colorado to Montana, westward to Idaho and the subalpine moist plains of northeastern California; probably also in Utah and Nevada. The specific name is inappropriate; most Calthas being more nearly round-leaved than this. The entire-leaved form on which Huth established his variety is somewhat rare and exceptional.

C. CHIONOPHILA. Acaulescent, with stoutish peduncles and scapes, and leaves thick and firm in texture, their outline from oval-subsagittate to obovate-subreniform, or even somewhat panduriform by an evident constriction below the middle, the whole margin usually coarsely and sharply dentate: earliest scapes either not equalling the leaves or little exceeding them: sepals 10 or fewer, oblong to obovate, large, the flower often 1½ inches in diameter: stamens very short, the filaments not longer than the anthers and widely dilated, of oblong outline, and even the connective subulate-dilated: mature carpels not known.

Obtained in the mountains of southern Colorado, near Pagosa Peak, at an altitude of 11,000 feet, by Mr. C. F. Baker, 28 Aug., 1899; and some earlier specimens in the U.S. Herbarium from southern Utah appear to be referable here, namely, those from Fish Lake at 9,000 feet, Marcus Jones, 8 Aug., 1894; also others from Marysvale, by the same collector in the same year.

New Species of Antennaria.

A. sordida. Stems densely tufted rather than cespitose, 5 to 8 inches high, firmly erect but rather slender: stolons crowded, ascending, leafy throughout and not rosulate: leaves oblanceolate, acute, ¾ inch long, more or less conduplicate, numerous on the flowering stem, and much alike here and on the stolons: the indument of both faces soft, rather loose, dull as to color, heads most 5 to 10 or more, short, subcampanulate, crowded and subsessile, forming a hemispherical or subglobose cluster: bracts in about 4 series, their scarious tips obovate-oblong, or some narrower, many with a few coarse serrate teeth, the innermost often cuspidately apiculate, all of a decided but often dingy or brownish pink color.

This formed a part of my original *A. rosea*, but is known only from the higher mountains of northern Colorado, where it occurs in moist sandy soil at 8,000 to 10,500 feet. Mr. C. S. Sheldon's n. 128, from North Park, near Teller, well represents the species; and my friend Mr. Holm has just brought better specimens from the headwaters of Clear Creek, these having been collected on the 11th of September, 1899. It can hardly be the original var. *rosea* of D. C. Eaton; but that name should be ignored, being a *nomen nudum*.

A. Holmii. Cespitose, the erect flowering stems of the female plant (male not known) 5 to 8 inches high and rather

slender: stolons short, depressed, rosulately leafy, the leaves plane and spreading, about ¾ inch long, obovate-spatulate, very obtuse, not even abruptly pointed, 1-nerved, greenish above yet clothed with an extremely fine and closely appressed silky tomentum, beneath silvery-white with a more dense indument of the same kind: cauline leaves oblong, acutish, spreading or ascending: heads large, 3 or 4, sessile or short-pedicellate: bracts of the involucre in about 4 series, their scarious tips ovate-lanceolate or narrower, acute or acutish, faintly tinged with pink, the herbaceous portion of the bract ending in a rather conspicuous brownish spot.

In open places among the more elevated pine woods on Long's Peak, Colorado, at about 10,000 ft., Theo. Holm, 8 Aug., 1899. Species allied to *A. aprica* of the lower mountains, but essentially different by its thin plane rosulate obtuse leaves, and their peculiar fine glistening indument; and the involucres with their brown-spotted bracts are also quite unlike those of any form of *A. aprica* which has yet appeared.

A. NARDINA. Cespitose, the slender stems of the male plant (female not known) about 6 or 8 inches high, tinged with red-brown under the sparse indument: stolons wiry but very slender, 2 or 3 inches long and sparsely or more densely leafy, the leaves all narrowly oblanceolate, of firm texture, almost pungently mucronate at the acute apex, both faces canescently tomentose, the indument fine and appressed but not lustrous: cauline leaves thin, narrow and erect; heads ten or more, very distinctly pedicellate and forming an almost exact corymb: tips of the involucral bracts obovate, obtuse, large and spreading, of very fine texture and a milky whiteness, though with a dark-purple spot at base: dilated tips of the pappus-bristles entire or crenulate rather than serrulate.

An exceedingly graceful and beautiful species, at least as to the male plant, found by Mr. Theo. Holm on dry ground

under spruce trees at about 11,000 feet on Mt. Massive near Leadville, Colorado, 22 Aug., 1899. His specimens were found in only a single patch, and are all staminate.

The specific name has no connection with the grass genus *Nardus;* but the foliage of this *Antennaria* is suggestive of that of lavender, of which one of the early names was *Nardus.*

A. PROPINQUA. Near *A. arnoglossa* but more slender and only half as large, the stolons relatively more elongated and more copiously beset with black gland-tipped hairs, the bracts of the flowering branch often rather strongly ciliate with them: mature leaves 1½ to 2 inches long, with almost elliptic blade and short petiole, mucronately acute, bright green and nearly veinless above, white-tomentose and obviously triple-nerved beneath: flowering branches (in the male, which alone is known) 3 to 6 inches high, bearing 4 or 5 involucres, the terminal one sessile, the rest short-pedicellate: bracts biserial, with large clear-white oblong-obovate obtuse tips: bristles of the pappus only slightly dilated and sharply serrulate at tip.

Collected only by the writer, on an open hillside at Harper's Ferry, W. Va., 14 May, 1898; only one large patch seen, and that male. Though obviously a near relative of *A. Parlinii* and *arnoglossa,* its small size, very differently shaped foliage and peculiarly narrowed and serrulated male pappus-bristles, compel one to regard it as wholly distinct. I hope that the female plant may be detected at no distant time. There is no *A. arnoglossa* in the Harper's Ferry region.

A. ALSINOIDES. Near *A. neodioica,* much like it in size, rather more slender, but the heads on shorter pedicels and thus more congested; stolons much more elongated, somewhat flexuous, equably leafy throughout, seldom rosulate at apex: leaves much more clearly differentiated into blade

and petiole, the blade ovate, acute, mucronate, abruptly narrowed to a slender petiole of more than its own length, the whole leaf an inch long or somewhat less, green and scantily silky-lanate above, white beneath with a silky tomentum ; heads 6 to 10, subcorymbose ; bracts oblong-linear, the herbaceous portion green, much longer than the scarious tips, these often very short or obsolete, but ordinarily from semi-oblong and obtuse in the outer, to lanceolate and acutish in the inner.

My specimens of this elegant species are all from the District of Columbia and adjacent Maryland, and of my own collecting in the autumn of 1897 and spring of 1898. I had believed them to represent, as a geographical variety, *A. neodioica*; but the first careful inspection made of the materials has disclosed characters which seem to demand the recognition of a species. The habitat of the plant is low and rather moist open pine groves. In such stations I have seen and collected it at Marshall Hall and at Magruder, in Maryland, and between University Station and Terra Cotta, D. C. It is frequent, though not plentiful, in its localities, and never forms extensive patches. No other *Antennaria* has been found associated with it, nor have any male plants been seen. The fully mature stolons, with their depressed mode of growth and scattered ovate-petiolate leaves, are remarkably—for an *Antennaria*—suggestive of *Alsine media*.

A. MEDIA, Greene, Pitt. iii. 286. Stolons short, leafy, rigid and subligneous, forming a rather dense mat, their leaves ½ to ¾ inch long, spatulate-lanceolate, acutish, white on both faces with a permanent woolly tomentum: flowering branches erect, slender, 2 to 6 inches high, lanate throughout, leafy to above midway with linear acute leaves, the upper portion naked and pedunculiform: heads 4 to 7, in a dense glomerate cluster, or one or more of them distinctly pedicellate and thus standing apart from the rest: bracts of involucre with dark greenish-brown tips in outline from broadly ob-

long and obtusish to linear-oblong and acute or acuminate: pappus of male flowers very little dilated.

One of our beginners in botanical authorship has lately published the complaint that, of my *A. media* no description has been given.[1] The complaint is not, I must confess, wholly groundless; although in giving the essential characters of the species as compared with those of *H. umbrinella* on the one hand, and of *A. alpina* on the other, I fully satisfied the actual requirements of publication, at least as regards the public of experienced phytographers. Nevertheless, I acknowledge it had been better to have given a diagnostic character for the species; and that is now done.

What I hold for the more typical *A. media* is the plant of the Sierra Nevada of middle California; such as Mr. Sonne has repeatedly collected and distributed from localities not far from Donner Lake. I judge it to occur all along the crest of that range of mountains, northward to Mt. Hood, whence Mr. Howell has distributed it. The British American specimens formerly cited by me are less typical, and might be distinguished as a variety.

The following is nearly allied to *A. media*, yet must be held specifically distinct.

A. BOREALIS. Habit and foliage of *A. media*, but stolons less firm, their leaves less densely woolly-tomentose: flowering stems less slender, somewhat taller, leafy up to the inflorescence: heads 4 to 7, more generally pedicellate, thus forming a more corymbose cluster: bracts of involucre with more amply developed scarious tips of a light reddish-brown, the outer broadly but somewhat cuneately obovate, obtuse, the inner oblong-obovate, acutish, all more or less lacerate-serrulate, in maturity somewhat squarrose-spreading: male plant not known.

Disenchantment Bay, Alaska, 10 Aug., 1892, Fred. Funston; his n. 101 (of my set).

---

[1] E. Nelson, in Bull. Torr. Club, xxiv. 210.

West American Asperifoliæ.—IV.

As the result of a prolonged and careful study of our North American species of Mertensia, I am convinced that nothing properly referable to *M. Sibirica* is known, at least to me, as inhabiting our continent. And as for *M. paniculata*, that seems to be subarctic, nothing quite answering to it having been found within the United States. Most of the specimens in our herbaria bearing one or the other of those names may be referred to published species, some of which were proposed long ago and then suppressed. Such are the following:

M. ciliata, Don., originally described as *Pulmonaria ciliata*, Torr. Ann. Lyc. ii. 224. Common in the Rocky Mountains; excellently defined by Torrey; its most salient characteristic being the short calyx, with oval or oblong obtuse ciliate lobes.

M. pratensis, Heller, Bull. Torr. Club, xxvi. 550. Although Mr. Heller compares this with *M. Fendleri*, with which he says it grows, all its real affinities are with *M. ciliata*, from which I had separated it, in the arrangement of sheets in my herbarium, on account of its narrow and acute calyx-lobes. But I should not yet have proposed for it specific rank.

M. Franciscana, Heller, l. c. 549. This plant was collected by myself ten years since, on the slopes of Mt. San Francisco. I had noted its peculiarly narrow-tubular corolla besides a few other feeble characteristics, but had not thought it specifically distinct from *M. ciliata*.

M. stomatechioides, Kellogg, Proc. Calif. Acad. ii. 147, fig. 43. In the Sierra Nevada and Cascades this takes the

place of *M. ciliata;* has a longer calyx, though the lobes are as obtuse as in *M. ciliata,* but they are not ciliate. No such hairs as Dr. Kellogg attributes to the species have been found by me, or are likely to be discovered. I apprehend Dr. Kellogg's error to have been that of taking a stellate hair fortuitously attached to the *Mertensia* from some other plant for one properly belonging to this; or else, and rather more probably, certain somewhat pustuliform though flattened and low protuberances abundant on the leaf-surface, were what he saw, and approximately reproduced in his figure.

The two species next succeeding, apparently hitherto undescribed, are of this same group of rather large moist-land species.

M. POLYPHYLLA. Stems about 14 to 18 inches high, arising singly from the branches of a rootstock, apparently without radical leaves, but very leafy from near the base to the summit, the whole herbage glabrous and very glaucous: leaves oblong-lanceolate, mostly about 3 inches long including the short petiole, abruptly acute at both ends, spreading or scarcely ascending, neither face callous-punctate, the margins obscurely callous-denticulate: flowers mostly subcorymbose at the very summit of the stem: calyx short, the ovate-oblong or oval lobes callous-ciliolate: corolla about ½ inch long, bright-blue, the rather ample campanulate limb somewhat longer than the subcylindric tube: obtusely and irregularly rugose nutlets well exserted from the calyx.

In clumps of dwarf willows, at 12,000 ft., near Pagosa Peak, southern Colorado, 8 Aug., 1899, C. F. Baker. Related to *M. ciliata,* Don., so common in other parts of the Rocky Mountain region, but it is of very different habit, and has a callous-punctate leaf-surface and distinctly ciliate leaf-margins. Our plant is particularly remarkable for the simplicity and the copious leafiness of its stem, the leaves being all alike, only that the uppermost are subsessile while the rest are petiolate.

M. PUNCTATA. Root not known: stems almost as leafy as in the last, evidently a yard high more or less, the herbage devoid of bloom and deep-green: leaves elliptic-lanceolate, 4 or 5 inches long, very acute, subsessile, roughish on both faces with muriculate points, the margin ciliolate with short and rather fine incurved hairs: inflorescence narrowly panicled: pedicels white-puncticulate: lobes of the short calyx triangular-ovate, obtuse or acutish, ciliolate: deep-blue corolla about ½ inch long, the ample limb slightly longer than the tube: nutlets rather sharply rugose.

Moist ground at 10,000 ft., near Pagosa Peak, Colorado, 15 Aug., 1899, C. F. Baker. By its calyx this also would be placed near *M. ciliata*, while by its lack of bloom, as well as by the character of its foliage, it is far enough removed from it; for that has a leaf-surface marked by broad low orbicular callosities, extremely unlike the small raised and sharp-conical punctuation of the present plant.

M. PILŎSA, Don., first published as *Pulmonaria pilosa*, Cham. in Linnæa, iv. 449, heads a subgroup of these large lowland plants, belonging exclusively to the Pacific coast, and distinguished by their more than ordinary hairiness. This one is from the high North, beyond Bering Strait. I have not identified it in any of our herbaria; but its long corollas, 1½ inches long, with tube pilose-pubescent within for half its length, are its essential characters. The other members of this small assemblage are alike in possessing a very short and broad corolla.

M. STRIGOSA. Plant manifestly tall, but lower part of stem and the basal foliage not seen: cauline leaves ovate-acuminate, subsessile, 2 or 3 inches long, finely strigulose-roughened above, more loosely and coarsely strigose beneath: pedicels and calyx canescently somewhat villous, segments of the latter lanceolate, rather short, not ciliate but both faces clothed with the rather dense strigose-villous or pilose hairi-

ness: corolla little more than ½ inch long, decidedly broad, the tube shorter than the limb.

Known only from along the Tananah river, Alaska, where it was obtained by Mr. Octavius S. Bates in 1881. The stream so named is, I believe, one of the tributaries of the Yukon.

M. PLATYPHYLLA, Heller, Bull. Torr. Club, xxvi, 548, is certainly of this group; and all three here associated are plants having a far closer likeness to the genus *Pulmonaria* than other and more typical *Mertensia* species exhibit.

M. SUBCORDATA. Stems two feet high, slender and slightly flexuous, leafy up to the loosely panicled inflorescence; basal leaves not seen, those of the stem ample, very thin, ovate, very acute, rounded or subcordate at base, all distinctly petiolate, the petioles sparsely hirsute-ciliate, this pubescence extending to the whole lower face of the leaf, the upper surface sparsely muricate-scabrous: flowers few, in loose panicled terminal cymes, their slender pedicels and also the oblong-lanceolate divisions of the calyx strigose-pubescent: corolla about 8 lines long, the cylindric tube rather wide, shorter than narrow-campanulate limb.

Species known only as collected by Mr. Howell, in the Umpqua Valley at Roseburg, Oregon, 3 May, 1887, and very distinct by many characters; the texture, outline, pubescence and remarkable petioles of the leaves all being peculiar; and the herbage seems to be not at all glaucous.

The three following species, proposed as new, belong to the group of more strict and simple-stemmed small upland comparatively xerophilous plants.

M. FUSIFORMIS. Stem erect, six inches to a foot high, usually solitary (occasionally two or three together) from a large oblong or fusiform root, simple and leafy to the summit: lowest leaves spatulate-oblong, long-petioled, the others

linear-oblong and sessile, all obtuse, glabrous beneath, rather strongly strigose-pubescent above: flowers in numerous short-peduncled cymes axillary to all the upper leaves, or sometimes more exclusively subterminal: calyx parted to the base, its lanceolate segments marginally almost crinite-hirsute, the pedicels and back of the calyx strigulose: corolla about 4 lines long, light-blue, the tube surpassing the calyx, but not longer than the rather ample campanulate limb.

A subalpine apparently dry-land species, obtained on Bob Creek, Colorado, at about 10,500 feet, by Baker, Earle and Tracy, 28 June, 1898, being n. 206 of their collection and distributed by mistake for *M. oblongifolia.* Also in Mr. Baker's collection of 1899, from Graham's Park, Rio de los Pinos, at 7,800 ft., said to be frequent in fields, and openings in pine woods; this plant smaller, and the leaves more strongly pubescent above.

M. BRACHYLOBA. Tufted stems a foot high or more, glabrous, glaucous, leafy throughout but the lower leaves much reduced and narrowly oblong, those of the middle portion oblong, the upper ovate-oblong, all sessile, somewhat cuspidately or mucronately acute, glabrous or slightly papillose-scabrous: flowers in a short leafy panicle, the peduncles apparently erect: calyx turbinate, its broad setulose-ciliate lobes only half the length of the tube, most of them broadly ovate and acutish: corolla barely a half-inch long, light-blue, the cylindric tube rather shorter than the broadly funnelform limb.

Foothills of the mountains of northern Colorado, near Fort Collins, 24 May, 1896, C. F. Baker, and not otherwise known to me; but the species is uncommonly well marked. It was distributed by Mr. Baker for a form of *M. lanceolata*, to which species it is not especially related.

M. BAKERI. Stems low, less than a foot high, tufted on a branching caudex from a branching root, simple and leafy

up to the rather dense and short terminal paniculate cyme; herbage pale with a somewhat villous-tomentose pubescence; lowest leaves oblong-spatulate, petiolate, the upper oblong-lanceolate, sessile: calyx parted almost to the base, the segments linear-lanceolate, obtusish, densely somewhat villous-ciliate, and also externally, together with the short tube and the pedicels, strigose-pubescent: corolla dark-blue, about 8 lines long, the tube twice the length of the calyx, its limb notably subcampanulate.

Summit of Mt. Hayden, southern Colorado, at about 13,000 feet, 14 July, 1898, Messrs. Baker, Earle and Tracy, n. 576. Bearing considerable likeness to *M. Fendleri* as to size, foliage, inflorescence, etc., but very remote from that species, as the calyx fully demonstrates.

Lithospermum albicans. Near *L. angustifolium*, but stems only 2 or 3 from the root, very erect from the base, commonly more than a foot high at first flowering, slender and simple up to the shortly racemose summit; base of stem, as well as pedicels and calyx, white with a fine and dense strigose pubescence, other parts silvery-hoary with a less fine and dense indument of like character: leaves linear, ascending or suberect, the margins scarcely revolute, beset with closely appressed setose hairs: corollas even at earliest flowering less than an inch long, salverform, deep-yellow, the rounded lobes crenulate: fruiting pedicels ascending: nutlets ovate, neither rugose nor pitted, but very smooth, white and shining.

Collected at Arboles, southern Colorado, by Mr. C. F. Baker, June 10 and 25, the specimens of the first date being in early flower, the others bearing fruit, and also the later and smaller corollas. Perhaps some New Mexican and Texan specimens which have been labelled *L. angustifolium* may belong here; but the species is well marked by its peculiarly strict upright and simple habit, white pubescence, small corollas and very smooth nutlets.

Lithospermum ciliolatum. Also allied to *L. angustifolium*, the stems, often 6 or 8 from the root, stoutish, ascending, barely 6 inches high at first flowering, equably leafy throughout and rather roughly strigose-pubescent: leaves oblong-linear somewhat spreading, the margins not in the least revolute, finely setulose-ciliate: early corollas large as in *L. angustifolium*, but the tube not as long (only 1 inch), of a rather light-yellow, the large rounded lobes erose: fruit not known.

Collected near Los Pinos, southern Colorado, 18 May, 1899, by C. F. Baker. The rough character of the pubescence, which on the stem is not appressed but spreading and hispidulous, and the plane foliage marginally ciliolate, are points which distinguish this plant from *L. angustifolium* clearly enough.

Lithospermum oblongum. Related to the last, and like it in habit, the slender stems mostly very numerous, ascending, only 4 to 6 inches high at early flowering, only sparsely leafy, their pubescence strigose but ascending rather than either appressed or spreading: leaves short, usually less than an inch long and from spatulate-oblong in the lowest to oblong, all obtuse, with revolute margin and a sparse short pubescence of appressed bristly hairs from a conspicuously pustulate base: flowers very few in the axils of the leaves at the summit of the stem, this usually simple but sometimes forked: corolla of the largest, 1¼ inches long, light-yellow, the ample spreading limb with lobes either erose or nearly entire, apparently not crenulate: nutlets acute, white and shining, not at all pitted but slightly turgid and rugose.

Hills about Aztec, northern New Mexico, growing among Nut Pines and Cedars, 26 April, 1899, C. F. Baker.

Oreocarya Bakeri. Perennial, the stout tufted and more or less decumbent stems about 6 inches high, sparingly

branching, leafy and floriferous almost throughout: leaves broadly oblanceolate and elliptic-lanceolate, petiolate, strigose-hispid and with a more dense fine closely appressed pubescence; the branches and calyx more hispid with spreading bristly hairs: racemes few, solitary or geminate, crowded, bracteate, the narrow-lanceolate bracts surpassing the fruiting calyxes: sepals lance-ovate, broad and short for this genus, not greatly surpassing the nutlets, these erect, ovate, sharply and somewhat sinuately rugose on the back, this circumscribed by a narrow margin, the ventral face pitted.

Collected on the Mancos River sage plains in southern Colorado, by Messrs. Baker, Earle and Tracy, 8 July, 1898, and distributed under n. 827. Species notable on account of its broad short calyx and strongly bracted inflorescence; and the nutlets are much more roughened than in other members of the genus.

Oreocarya lutescens. Stems 6 to 10 inches high, erect and simple, one from each of the many branches of the decumbent and partly subterranean caudex; the whole herbage densely silvery-strigulose, the inflorescence with also a yellowish hirsute pubescence: lowest leaves narrowly oblanceolate, those scattered on the flowering stem more oblong-lanceolate: flowers in a short dense subcapitate thyrsus: calyx-lobes elongated, narrowly linear, all but their tips concealed by the dense yellowish hirsute hairiness: corolla ½ inch long, light-yellow, salverform, the tube well exserted from the calyx.

Common on hills about Aztec, New Mexico, 25 April, 1899, C. F. Baker.

In naming and defining the following species of Lappula, several of which are of what may be called the cupulate group, I make no attempt to continue in use Gray's varietal name *cupulatum*, for that was made to include, as one variety

of *L. Redowskii*, a number of easily definable species; and there is no determining to what one of the segregate species the name should be applied rather than to another. Moreover, the earliest known cupulate species obtained specific rank far anteriorly to the publication of *L. Redowskii*, var. *cupulatum*; I refer to

L. TEXANA, first published as *Echinospermum Texanum* by Scheele, Linnæa, xxv, 260. Any one who can read Scheele's characterization of the species must see that it had cupulate nutlets; and Gray cited it as a synonym of his var. *cupulatum*. The original is said to have been found growing under mesquite bushes near San Antonio, Texas; but I have not yet seen any specimens that answer well the description.

L. CORONATA. Annual, erect, only a few inches high, with few ascending branches and a rather broad oblong foliage: nutlets all alike, whitish, the body entirely devoid of tuberculation or murication, very smooth or else merely wrinkled, marked by a distinct but only slightly raised dorsal ridge, and circumscribed by an elevated rounded and crown-like inflated margin which bears a row of very short prickles glochidiate at the tip.

On mesas near Tucson, Arizona, collected 18 April, 1884, by C. G. Pringle. Species very different, both in habit and the character of the nutlets, from all others. The aperture of the crown, through which is seen the low smooth or wrinkled and ridged back of the nutlet, is broadly and roundly ovate.

L. HETEROSPERMA. Larger than the last, diffusely branching from the base, or the starved specimens more upright and less branching, but with no tuft or rosula of basal leaves; all the branches floriferous from the base and loosely so, each flower subtended by a leafy bract, this far surpassing even the mature fruit: nutlets dissimilar, 3 with an elevated coroniform thickened and aculeate border, forming an ovate

lanceolate aperture, the fourth with about 6 aculeæ almost distinct, but each dilated and slightly inflated at base, those on the opposite margins closely approximate, leaving exposed only the line of sharp murication which forms a dorsal ridge; the body of all the nutlets muricate ventrally, *i. e.*, outside the disk or crown; even the crown finely muriculate below and among the aculeæ.

The oldest specimens of this in my possession were collected by myself at Peach Springs, northern Arizona, 2 July, 1889. They consist of a few dead and dry summer stems divested of foliage, but bearing plenty of mature fruit. Better ones, showing foliage and flowers as well as perfectly formed nutlets, were distributed last year by Messrs. Baker, Earle & Tracy, from near Mancos, in southwestern Colorado. In these the herbage is subcinereous with a hirsute pubescence, the proper leaves linear or oblong-linear; those of the loose spikes oval, corollas pale-blue.

L. DESERTORUM. Habit of the last, the numerous branches equally floriferous from the base, but the inflorescence more crowded, the bracts much smaller, not surpassing the fruits: nutlets not strongly dissimilar, the long aculeæ dilated below, in one almost disconnected, in three quite connected at base and unitedly somewhat vaulted over the disk of the nutlet, scarcely or not at all inflated; both faces of all the four nutlets strongly muricate, a line of coarser murication forming a ridge up and down the disk or dorsal side.

Deserts of central Nevada; described from specimens obtained by the writer, near Holborn, 16 July, 1896; and there is another in my herbarium, contributed by Mrs. Bingham, of California, who picked it up at a railway station, many years since, somewhere to the eastward of the State of Nevada, probably in Utah or the eastern part of Wyoming.

L. COLLINA. Stems several from a large and dense rosette of basal leaves, racemosely branched toward the summit; herbage canescent with a rather soft pubescence: rachis of the spike or raceme rather slender, the bracts small and narrow: nutlets densely white-tuberculate on all sides, and with a marginal series of about 8 stout aculeæ, these unconnected at base in one, in the other three connected and often somewhat inflated below.

Species extremely unlike *L. desertorum* in foliage, pubescence, mode of growth, and of different habitat, but characters of fruit less pronounced. I know the plant only as in the U. S. herbarium from Marcus Jones, who obtained it at various stations in Utah in 1894; one being Kingston, at 5,300 feet; another, Pahria Cañon, same altitude.

L. MONTANA. Erect, slender, branching only at summit and the spikes not elongated, the stem from amid a dense basal rosette of short elliptic-lanceolate leaves, the cauline foliage oblanceolate, the whole herbage cinereous with a pubescence mostly appressed: bracts of the short spikes small and inconspicuous: nutlets narrowly ovate, the disk very small for the nutlet, circumscribed by a distinct though not very prominent cartilaginous entire margin, from along the inner base of which arise 8 or 10 short subterete aculeæ; the surface of the nutlet on all sides rather coarsely muricate-tubercular.

A very strongly marked species in the character of the nutlets; known to me only in two specimens communicated to me long since, by the Rev. F. D. Kelsey, and collected by him at Helena, Montana, in 1887.

L. FREMONTII. *Echinospermum Fremontii*, Torr. Pac. R. Rep. xii², 46 (1860). *Lappula cenchroides*, A. Nels. Bull. Torr. Club. xxvi. 243 (1899). This species, well defined by Dr. Torrey almost forty years since, is usually a much larger

plant than any of the foregoing; and the great length of the main row of prickles is more characteristic, perhaps, than the fact that, outside of this definite row, a series of smaller aculeæ is commonly developed from what in other species appear as a mere lateral murication or tuberculation.

Besides having examined the original specimen from which the description was drawn for Stevens' Report, I have one collected by myself at Laramie, Wyoming, 28 July, 1889; another is from Prof. Nelson from the same region, this representing his entirely synonymous *L. cenchroides;* and a third sheet of the same, though the specimens are smaller, was given me by Mr. John Macoun, who collected it in the Milk River district of Assiniboia, 7 July, 1895.

Since Torrey distinctly credits the species to a locality within the limits of what is now California, whence, however, no specimens have come during all the time that has lapsed since 1860, and all our supplementary material is from the Rocky Mountain region, one is compelled to believe that the collector of Dr. Torrey's type specimen was in error as to his recollection of where he obtained it.

L. OCCIDENTALIS. *Echinospermum Redowskii*, var. *occidentale*, Wats. Bot. King Exp. 246, in part at least. This is very widely dispersed from toward the Rocky Mountains almost to the Pacific coast; is well marked among the species here defined by its 7 to 11 strongly developed marginal prickles usually of triangular-subulate form, lightly or not at all connected at base, and, I believe always, grooved or channeled down the whole inner face; the surface of the nutlet being tuberculate, not muricate.

There is no evidence of the occurrence, anywhere in America, of the true L. *Redowskii.*

New or Noteworthy Species.—XXVI.

With Plate XI.

Chænactis pedicularia. Low subalpine perennial, with many decumbent leafy stems 5 to 8 inches high from a branching rootstock, and no rosulate tufts of basal leaves: stoutish stems and younger foliage canescently tomentulose: leaves rather short, on long flattened petioles, once or twice pinnately parted into rather crowded, divaricate or retrorse segments all obtuse: heads large, nearly an inch high, short-peduncled, solitary at the ends of the few branches: flowers whitish: pappus-paleæ about 6, shorter than the corolla but not of very unequal length, 4 linear-oblong, 2 narrowly linear and somewhat shorter.

Mountains of southern Colorado, at 11,000 ft., above La Plata, Baker, Earle and Tracy, 16 July, 1898, n. 536. A perennial species, of the group hitherto represented only by the two annual species, *C. macrantha* and *C. Xantiana.*

Machæranthera varians. Biennial or short-lived perennial, the solitary or few stems erect from the base, commonly a yard high, simple and leafy up to the corymbose or somewhat panicled summit, from nearly glabrous below to glandular-puberulent, the upper portion and the branches glandular-hispidulous or hispid: leaves linear-lanceolate, usually 3 or 4 inches long, sessile, varying from entire to more or less regularly spinulose-toothed, mostly glabrous on both faces but marginally glandular-pubescent or ciliate: heads numerous, large and showy with many purple rays; bracts of the hemispherical or subcampanulate involucre in 4 or 5 series, all with long linear-subulate spreading glandular-viscid herbaceous tips: oblong-linear achenes nearly glabrous, hardly striate.

Mountain parks near Pagosa Peak, southern Colorado, at 8,000 feet, 30 Aug., 1899, C. F. Baker; also at Chama, N. Mex., 4 Sept., by the same collector. Related to *M. aspera* of similar localities in northern Colorado, and intermediate between that and *M. Bigelovii.* A large and showy species, remarkable for the variability of its foliage, and differences in degree of pubescence.

MACHÆRANTHERA PARTHENIUM. Annual, stoutish, 2 feet high, narrowly paniculate from near the base; stem and branches canescently tomentulose: leaves pinnately parted into 5 to 7 narrowly cuneiform segments, these again more or less deeply cleft: heads short-peduncled at and near the ends of the short branches; involucres campanulate, 4 or 5 lines high, of several series of narrow bracts all with long linear-acuminate granular-viscid more or less spreading green tips: rays many and narrow: achenes oblong-linear, compressed, strongly striate under an appressed silky pubescence.

C. G. Pringle, Davidson's Cañon, Arizona, 10 Sept., 1884, distributed as *Aster tanacetifolius*, but very different from that.

LEUCELENE ALSINOIDES. Branches of slender caudex naked except at summit, there bearing tufted linear-spatulate acute leaves which are strongly hispid-ciliate with hairs inflexed or incurved above the middle, the leaf otherwise scabrous and granular-viscidulous; cauline leaves similar but linear, those of the sterile branchlets acerose and appressed, tipped with long slender white bristles: pedicels of the heads canescent with appressed somewhat silky hairs; bracts of involucre very acute, sparingly strigulose and scabrellous.

Rocky hills and plains at Concho, western Texas, flowering in April and May; distributed by Reverchon.

Solidago bellidifolia. Tufted decumbent stems 2 to 5 inches high, these and the whole herbage glabrous except the sparsely scabrous leaf-margins and a few hairs at the base of the petioles: lowest leaves orbicular, the others successively round-obovate and spatulate-obovate, all coarsely crenate, on broad petioles longer than the blade, the uppermost narrower, cuneate at base and sessile: heads few, large capitate-clustered at summit of stem; bracts of involucre oblong-lanceolate, obtusish, in about 3 series, the margins of the inner scabrous-serrulate at tip.

Collected by T. J. Howell, on Mt. Adams, Washington, 8 Aug., 1882, and distributed for *S. pumilus* var. *alpina.*

Polemonium luteum. Perennial, a foot high, more or less, the stems arising singly from slender almost horizontal rootstocks, simple, or toward the summit sparingly branched: herbage glabrous, only the calyx and pedicels showing scattered short and slender tortuous hairs: leaflets oblong-lanceolate, scarcely acute, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, rather crowded, in 10 or 12 pairs: flowers mostly solitary or in pairs in the axils of the upper leaves, nodding on short pedicels: calyx nearly $\frac{1}{2}$ inch long, campanulate, cleft to the middle, the lobes triangular-ovate, acute: corolla yellow, campanulately spreading from a short tube, the whole more than $1\frac{1}{4}$ inches long and nearly as broad, the broadly obovate lobes either very obtuse, or very abruptly short-pointed.

This is Mr. Pringle's n. 6930, from the Sierra de Pachuca, Hidalgo, Mexico, 1898, distributed under the name of *P. grandiflorum,* which is a villous-pubescent plant with long and not widely expanding blue or purple corollas.

Gerardia lancifolia. Annual, slender, 2 feet high more or less, and sparingly branched from the middle or from toward the base; herbaceous angles of the stem and branches, as also the leaf margins, delicately and sparsely scaberulous, the plant otherwise glabrous: leaves thin and

plane, mostly 2 to 2½ inches long, linear-lanceolate: flowers on filiform spreading pedicels an inch long, this with the flower not equalling the floral leaves: calyx with venulose tube and triangular acute teeth broader at base than long: corolla rose-red, more than a ½ inch broad, with very short broad and open throat, this and the tube together scarcely longer than the lobes, the upper of these one-third shorter than the others, not strictly erect but even somewhat spreading like the others, all lightly pubescent and ciliolate: stamens distinctly exserted; filaments very hirsute, anthers less so.

Collected by the writer, on a sedgy river-bank, near Ridgeville, Indiana, 24 Aug., 1899. Species allied to *G. tenuifolia*, but very distinct from it in floral character, and quite remarkable among true Gerardias for the length and breadth of its foliage; these giving a leafiness of aspect to the plant as a whole, such as none of its allies exhibit. (Plate XI.)

ORTHOCARPUS CUSPIDATUS. Near *O. imbricatus*, which it resembles in size and habit, but the leaves elongated, cleft to below the middle into 3 narrowly linear lobes, or some entire and linear-attenuate: lowest bracts of the spike lanceolate to ovate, with or without a pair of short subhastate lobes at base, the others purple and chartaceous, oval, entire, obtuse, cuspidately mucronate: corolla light-purple, large, much exceeding the bracts and the lip strongly inflated, the galea nearly straight.

Ashland Butte, Siskiyou Mountains, southern Oregon, 18 July, 1887, Thomas Howell; the specimens distributed for *O. pachystachyus*, but differing from that altogether in habit. foliage, inflorescence and floral characters, and equally distinct from *O. imbricatus*. I believe that *O. pachystachyus* is not yet known except by the original specimens collected and distributed by myself in 1876, its locality being the plains of Shasta River in northern California.

GERARDIA LANCIFOLIA, Greene.

Vol. IV. Part 22.

PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Professor of Botany in the Catholic University of America,

WASHINGTON, D. C.

January—March, 1900.

CONTENTS.

	Page.
Necker's Genera of Ferns, I,	103
A Fascicle of Senecios,	108
New Species of Coleosanthus,	124
A Decade of New Pomaceæ,	127
A Fascicle of New Papilionaceæ,	132
Notes on Violets, (Plate xii)	139
Some New or Critical Ranunculi,	142
New or Noteworthy Species, XXVII.	146

Price, Fifty Cents

Payot, Upham & Co., *San Francisco*: William Wesley & Son, *London*.

Necker's Genera of Ferns—I.

Among many interesting and some quite surprising propositions made by Professor Underwood in his recent *Review of the Genera of Ferns*, the most surprising of all to me is the statement that none of Necker's fern-genera "are based on types, and no earlier references are cited." Having long regarded Necker as among the most original and discerning of eighteenth-century botanists, I have studied him, at intervals during several years, with a steadily growing appreciation of his genius; and, having acquired some sort of mastery of his rather peculiar terminology—such as no one can gain but with some time and patience—I have not usually found it at all difficult to identify his genera. In a word, my experience with his phanerogamic genera has shown me that his generic types are indicated quite as plainly as there is any need of indicating them. I should never have supposed that any botanist could say that Necker's genera are not based on types; and I can only account for Professor Underwood's pronouncement upon two hypotheses. One is, that he has not seen Necker's work at all. The other is that, having access to the work, he could not take the necessary time and pains to learn to read it.

In running over the fern-genera of this author, the first name we come upon that is indicated as a name for a proposed new genus is *Achomanes.* Conversant with his methods in name-making, I feel perfectly confident, without stopping either to read the generic diagnosis, or to note his positive statement of where in Linnæus the type-species are to be found, that the genus is taken out of *Trichomanes.* I recall, for example, that out of Linnæus' *Senecio* Necker took a genus *Anecio;* out of *Verbena* a genus *Abena;* out of *Ver-*

Pittonia, Vol. IV. Pages 103–110. 2 Jan., 1900.

besina a genus *Abesina;* out of *Lycopodium* an *Acopodium,* and many more such. But, as I have intimated, we are not left to merely infer that the type of *Achomanes* lies somewhere in the *Trichomanes* of Linnæus; for, having so well described the genus that a good pteridologist might, I believe, make out the type species without a word of bibliographic reference, he yet proceeds to say that the type is a certain species of *Trichomanes* according to Linnæus; and, when he adds to this the further hint that it is among the simple-fronded species, it is told us as plainly as need be that the type of *Achomanes* is *Trichomanes membranaceum,* Linn.

I grant that *quædam* is a more or less unhappy type-indication, in that it may be singular, indicating a monotype, or it may be plural, indicating a genus of several species; but that is here of no importance. According to Professor Underwood's understanding, as well as my own, about generic types, *the* type-species is the first species enumerated in the group. Linnæus has a group of simple-fronded *Trichomanes* made up of three species; but *T. membranaceum* heads the list, and so, even if Necker's *quædam* be given the plural rendering, that species is still *the one* type-species of *Achomanes.* Moreover, as compared with the other two species of Linnæus' group with simple fronds, this one is preëminently simple, for the fronds of the other two are pinnatifid; they are only technically simple. The only Linnæan *Trichomanes* which is obviously simple-fronded, and which no one could at first glance mistake for a fern with pinnate frond is this one.

It will be discovered by any one who will make the investigation herein outlined, that this ACHOMANES MEMBRANACEUM (*Trichomanes membranaceum,* Linn.; *Lecanium membranaceum,* Presl.) is with Linnæus, at least in the *Species Plantarum,* the type-species of *Trichomanes.* But this fact is of no importance here. What I am controverting is only the statement—a most unfortunate one, surely—that all

Necker's fern-genera are nonentities, not represented by types, nor to be recognized with certainty.[1]

There is another of our author's fern-genera more easily recognizable, if possible, than *Achomanes*, and that is ŒTOSIS. It is taken, Necker is careful to tell us, out of the simple-fronded Pteris species of Linnæus. The Linnæan group placed under the caption "*Frondibus simplicissimis*" is made up of the four species, *P. lanceolata*, *lineata*, *tricuspidata* and *furcata*. Now, out of Necker's indicative note "*Frondes simplices.* Quæd. Pterid. *Linn.*" alone, we can make nothing more definite than that some one or more of these constitute his *Œtosis*. But we have not yet read his generic diagnosis, or even that part of it which according to the terminology of Linnæus was called the *character essentialis*, and which with Necker is termed the *character peculiaris*. Now this particular and decisive mark of his *Œnosis* Necker says is, that the lines of the fructification are parallel on the frond as a whole. In this light the perfect identification of this genus should be as easy as the distinguishing of two parallel lines from two converging ones. In order that any frond may have its marginal fruiting lines parallel, it must not only be a simple frond but a *linear* one. *P. furcata* can not be a member of *Œtosis* because its fruit-lines converge in pairs, each pair forming two sides of a triangle. *P. tricuspidata* is equally excluded by the fact that, while along the linear and entire middle of the frond they are parallel, they take the very extreme of a zigzag course across the cleft frondal apex. *P. lanceolata* has a lanceolate frond, whose marginal fruit lines never do, and by the most obvious certainties of mathematics never can run parallel, so long as the frond retains a lance-shaped outline. Only one of the four remains, and that is *P. lineata*. Its fronds are all invariably simple and linear; its fruit-lines are absolutely parallel; and there is no fact in all the

---

[1] See Mem. Torr. Club, vi. 259.

genus-making of the centuries more certain than that with Necker ŒTOSIS was a monotype equivalent to *Pteris lineata*, Linn., and the *Vittaria lineata* of later botanists. But Necker's name antedates *Vittaria* by three years.

Among the older and more unquestioned species of this genus, the following may be enumerated:

Œ. LINEATA. *Phyllitis lineata*, Petiver, Fil. 126. t. 14. f. 3 (1712). *Pteris lineata*, Linn. sp. Pl. ii. 1073 (1753). *Vittaria lineata*, Swz. Syn. 109 (1806).

Œ. FILIFORMIS. *Vittaria filiformis*, Swz. l. c.

Œ. ZOSTERÆFOLIA. *Vittaria zosteræfolia*, Willd. sp. v. 406 (1810).

Œ. ISOËTIFOLIA. *Vittaria isoëtifolia*, Swz. l. c.

Œ. ELONGATA. *Vittaria elongata*, Swz. l. c.

Œ. ENSIFORMIS. *Vittaria ensiformis*, Swz. l. c.

There was, I think, no eighteenth-century botanist, unless it may have been Adanson, who equalled Necker in respect to the number of well-defined new genera which he based on old species as types. His whole work, in the *Elementa*, was that of undoing Linnæus' artificial groups, miscalled genera, and indicating natural ones in their stead. I recall no instance in which he proposed a new genus based on a new species.

Let us observe after what manner he dismembers the rather large Linnæan genus *Asplenium*. His segregates of it are two only; and the first he names *Onopteris*, giving, over and above the generic character, the statement that the Linnæan Asplenia with compound fronds represent it; and if one must demand of him, unreasonably, that he name a type-species, has he not done so in the very fact of his

having adopted one of the Linnæan species names (*A. Onopteris*), as the genus-name?

It is the most natural and rational of inferences, that when a species-name is raised to the rank of a genus-name, the genus including that species, said species is the type of the genus. But curiously enough, Necker's *Onopteris* is doubly anchored to *A. Onopteris* as its type; for that name is a synonym of *Asplenium Adiantum nigrum*, Linn., and under this its prior appellation, it heads that Linnæan group of compound-fronded species which Necker cites as the equivalent of his proposed new genus. If, as a critic of fern-genera, I had even wished to avoid knowing what *Onopteris* is, or what its type-species is, I do not see how it could have been done but by wilfully ignoring all the indications which Necker gives.

And as for the *Asplenium* of Necker, it is made to include *Scolopendrium* and its near allies, and has the true *Scolopendrium* for its type. That is clearly enough indicated by the author's writing the French name of the Harts Tongue, Scolopendre, as the vernacular (French) synonym of his *Asplenium*. But what is more, the description is that of *Scolopendrium* and not of any *Asplenium* of later authors. And in this our author was simply standing by the doctrine of many early and learned botanists, as well as some of the ablest contemporaries of Linnæus, that the *Asplenium* of the ancients was the Harts Tongue. Even Linnæus, it may be observed, places it in the first of his four groups or subgenera *Asplenium*. So that the *Asplenium* of Necker can be disposed of intelligently and accurately in no other way but as a synonym of *Scolopendrium*, *i. e.*, *Phyllitis*.

A Fascicle of Senecios.

S. scalaris. Stems apparently single from the perennial root, rather slender, 1 to 2 feet high and erect; the growing leaves and also the bracts of the inflorescence showing some flocculent tomentum, but the plant otherwise glabrous: leaves of the basal tuft oval in outline, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, dentate or subpinnatifid, slightly succulent, very erect on stout petioles an inch long; cauline leaves longer, of linear or narrow-lanceolate outline, sessile and pinnatifid, very erect, almost appressed to the stem: heads 4 to 10, short-pedicellate and forming a densely subcorymbose cluster: bracts of the broad and short involucre about 12, broadly lanceolate, acute, glabrous and of a vivid green: rays conspicuous, orange-color.

Collected in the Sierra Madre, Chihuahua, Mexico, at 7,500 feet altitude, 13 July, 1899, by Mr. Townsend; communicated by Prof. E. O. Wooton. A member of the same group with *S. aureus*, but distinctly unlike any of the many Rocky Mountain allies of that species. My specimens are imperfect as to the subterranean parts, and the individual stem with its tuft of basal leaves may possibly be one of a connected bunch from a branching crown or caudex, but I see no indication of such mode of growth.

S. flavulus. About a foot high, erect and slender, from a short and nearly upright rootstock, leafy toward the base, glabrous or nearly so except the margins of the petioles, which are densely arachnoid-tomentose: leaves small, variable, the lowest very small, suborbicular, crenate, those next succeeding ovate or cordate-ovate, acute, evenly but more incisely cut, these in turn passing to more elongated subsessile or sessile ones, which are bicrenate or somewhat pinnatifid, those next the cymose umbel sessile and bract-like: heads 2 to 6 or 7, on slender unequal pedicels, sub-

campanulate, little more than ¼ inch high: rays numerous but short, all the flowers light-yellow.

A member of the difficult group of which *S. aureus* is typical, but well enough marked by its small size, prevailingly cordate-ovate acute small leaves, and short broad heads of light yellow flowers. Such densely white-lanate margins to the petioles are not seen in other allied species. The plant was collected by Mr. Carl F. Baker, at Arboles, southern Colorado, 15 June, 1899; the habitat is said to be damp shady places along streams.

S. DIMORPHOPHYLLUS. Stems a foot high more or less, from short erect rootstocks; herbage wholly glabrous, light-green and apparently in some degree succulent: basal leaves mostly about an inch long, oval and nearly or quite entire, on flat somewhat winged petioles of about the same length, these commonly much dilated at the insertion, or some spatulate throughout, with no distinction of blade and petiole; cauline few, scattered, triangular, sessile and clasping, from coarsely crenate to deeply sinuate-toothed: heads few, mostly 3 to 5, rather closely corymbose; involucres subcampanulate, only 3 or 4 lines high, rays numerous and much longer, golden-yellow.

In spruce woods toward the limit of trees, at 10,500 feet in the mountains of southern Colorado about Pagosa Peak, collected 6 Aug., 1899, by C. F. Baker. A member of the *S. aureus* group, and a similar but smaller plant of northern Colorado, with rays saffron-colored, forms a part of the *S. aureus* var. *croceus*, Gray. The contrast is very marked between the small always rounded and obtuse basal leaves, and the broad triangular pointed ones of the stem.

S. VALERIANELLA. Plant glabrous and the herbage thin and delicate, the rootstocks slender and densely tufted, bearing numerous and crowded slender-petioled erect leaves, the blade not half the length of the petiole and about ¾ inch

in diameter, from round-obovoid to almost orbicular, lightly but rather evenly crenate: flowering stems slender, decumbent at base, 4 to 6 inches high, commonly monocephalous, rarely with 2 heads; cauline bracts very variable, a few oblanceolate, some subulate-lanceolate, others somewhat lyrate: involucre subcampanulate, 3 or 4 lines high and of nearly the same breadth, of numerous broad thin bracts and one or more rather broad and herbaceous bractlets at base: rays 10 or more, broad and short, golden-yellow.

This is Mr. J. B. Leiberg's n. 1376 as seen in the U. S. Herbarium, collected in 1895 in the Cœur d'Alene Mountains, Idaho. The sheet is labeled *S. petræus;* but the plant is extremely unlike that species, and very much resembles in its rootstocks and pale thin foliage what some small valerian might be.

S. OVINUS. Densely tufted rootstocks stout, the whole plant dwarf, the leaves only 1 inch high inclusive of the petiole, the monocephalous scapiform stem not more than 2 inches: leaves thickish and subsucculent, variable in outline, from suborbicular and distinctly petiolate to subspatulate, none more than ½ inch in diameter, all coarsely dentate, the petioles flocculent, at least when young: head subcampanulate, ⅓ inch high and about as broad exclusive of the 12 to 15 rather long and showy yellow rays: bracts of the involucre lanceolate, but tapering abruptly and somewhat acuminately from near the middle.

Collected on Sheep Mountain, Alberta, Canada, in July of 1895, by Mr. John Macoun, the specimens bearing the number 11,619 of the Canadian Survey Herbarium.

S. CANDIDISSIMUS. Allied to *S. werneriæfolius*, rather larger, the rootstocks subligneous and more enduring, the leaves broader and more conspicuously petiolate, both their faces very white with a thick dense permanent tomentum: leaves oblanceolate, obtuse, mostly entire, some with a few

teeth toward the apex, all with a narrow revolute margin, the broad raised midvein and several of its branches very prominent beneath: scapiform flowering stems white-floccose, 3 to 5 inches high, bearing small and few scattered bracts: heads in a subcorymbose cluster, some long-pedicelled, others subsessile; involucres hoary-tomentose: rays golden-yellow.

From the Sierra Madre, Chihuahua, Mexico, at 7,500 feet, collected by Mr. Townsend, 24 May, 1899. Though much like its Rocky Mountain homologue named above, as to mode of growth, the foliage is almost exactly that of the shrubby *S. Palmeri* of Guadalupe Island. It is a beautiful species, never in the least glabrate in maturity, and the leaves of two seasons are evident upon the subligneous and rather elongated caudex.

S. Purshianus, Nutt. Trans. Am. Phil. Soc. vii. 412 (1841). *S. Laramiensis*, A. Nels. Bull. Torr. Club, xxvi, 483 (1899). More than twenty years since, I knew this plant somewhat familiarly, and took it, on faith in authorities, for *S. canus*, as Mr. Nelson did until lately; and so, when what afterwards came to pass, the real *S. canus* came to my notice, I saw its distinctness from the other and named it *S. Howellii*. When this error of having made a synonym for the true *S. canus* came to be recognized as an error, I attempted to make out the characters of the Wyoming plant as distinct, and should have created a synonym for that, as Prof. Nelson has now done, had I not discovered it to be the *S. Purshianus* of Nuttall. Its range is not so very limited. I have collected it myself not only near Laramie, but also in several places about Cheyenne, as well as in northern and even middle Colorado, where it is subalpine or almost alpine. I have a suspicion that in its most reduced high-mountain state it was actually referred by Asa Gray to his *S. werneriæfolius*, to which species it bears quite as much likeness as to normal and typical *S. canus*, as Prof. Nelson has observed.

Pittonia, Vol. IV. Pages 111–126. 10 Jan., 1900.

S. Fendleri, Gray, Pl. Fendl. 108 (1849). *S. Nelsonii*, Rydb. Bull. Torr. Club, xxvi. 483 (1899). Prof. Nelson appears to have been the first writer to describe the habital peculiarities of *S. Fendleri* in its mature condition. That the species is emphatically multicipitous, forming usually a considerable and rather compact mat, as it were, of flowering stems and short leafy crowns, has been observed by me, since 1870; and I have seen and known it as such, all the way up from middle New Mexico to southern Wyoming. But this characteristic is one which Dr. Gray never inferred from the herbarium specimens, though many must have passed under his eye from which he might have drawn such inference. But there is another inference which, it seems to me experience should have taught both Mr. Rydberg and Mr. Nelson to make, and that is, that multicipitous perennials must, in their early life, appear as simple and single individuals; and with me it is a matter of repeated observation, that *S. Fendleri*, as well as the rest of the multicipitous species, at its first year of flowering, appears as a much larger plant than usual, more branching and more copiously flowering, the leaves more ample and quite undivided, and all from a single, simple leafy crown on a perpendicular root, with no sign or hint, as yet given, of the final, well matured, normal, and therefore typical multicipitous state. It is evident to me, as I read again the original diagnosis of *S. Fendleri*, that what the author had before him was, the rank juvenile single condition of the species, such as Mr. Nelson certifies to as existing in the Engelmann herbarium and there representing it. Much of the confusion that has been made in Rocky Mountain Senecios has originated in ignorance of the fact that all these matted species, propagating by seeds only, as all of them do, exhibit nothing of their ultimate multicipitous habit until after the year of their first flowering. Collectors, of course, gather in and distribute specimens of the same species under these different aspects, and the closet botanist does with them what he can.

The young and simple states of this I have found, and so have others, in abundance at the northern limits of the species, often with foliage almost totally unlike what is seen in the old and perfect state; and the old, mature and widely multicipitous state is just as common in New Mexico and southern Colorado; though the plant of the South, in whatsoever stage of development, is more than twice as large as that of the cold and dry hills and plains of Wyoming, where all southern species, if they reach that range, are starved and stunted.

S. MUTABILIS. Resembling *S. Fendleri*, but stouter and of more herbaceous texture, the branches of the caudex stout, in no degree subligneous, erect or ascending, the mature plant thus forming a small and dense tuft rather than a broad loose mat: pubescence extremely varied, some plants with foliage glabrous above but more or less tomentose beneath, some equally and hoarily tomentose as to both faces, but the tomentum always more loose and flocculent and far more apt to be deciduous than in *S. Fendleri:* leaves as to outline varying from obovate-spatulate to broadly or narrowly oblanceolate, the margin from almost or quite entire to tridentate at the apex, evenly serrate-toothed throughout, or sinuately or pectinately or even somewhat lyrately pinnatifid; even the reduced cauline ones from oblanceolate and entire to linear and pectinate-pinnatifid: heads usually rather fewer and larger than in *S. Fendleri*, the involucres glabrous: oblong 4-nerved rays more deeply tridentate, varying from light-yellow to nearly orange-color.

In dry lowlands about Arboles and Los Pinos, southern Colorado, collected in May and June, 1899, by C. F. Baker. A species difficult to diagnose, on account of the extreme variability of its foliage and the degree of pubescence; but as a whole indubitably distinct from *S. Fendleri* by its fleshiness and compact habit. It is, indeed, quite analogous to the *S. compactus* of the plains of northern Colorado, and perhaps allied to it as closely as to *S. Fendleri.*

S. COGNATUS. Stems 10 to 16 inches high, commonly almost naked and scapiform and bearing a corymb of 3 to 6 or 7 heads of larger than middle size: herbage green and almost glabrous, varying to almost canescently tomentulose: leaves in the basal tuft erect, slender-petioled, from obovate with cuneate base, to attenuate-spatulate, mostly serrate or serrate-toothed, some crenate, a few even subpinnatifid, 1 to 1½ inches long, on slender petioles often twice as long; reduced cauline ones when present oblanceolate and mostly pinnate-toothed: heads about ⅓ inch high, on elongated and minutely subulate-bracted pedicels, these and the base of the involucre tomentulose: rays linear-oblong, deep-yellow or orange, 4-nerved: achenes with scattered almost papilliform hairs on the angles.

In dry lowlands at Piedra, southern Colorado, 11 July, 1899, C. F. Baker. Species as it were intermediate between *S. Balsamitæ* and *S. mutabilis*; very distinct from the last by its nearly naked stem and large heads. The stems also seem to have been solitary, or nearly so, from stout ascending or partly almost horizontal rootstocks. The smaller plants are monocephalous. The rays vary in intensity of coloring.

S. CROCATUS, Rydb. Bull. Torr. Club, xxiv. 299. If I were revising the genus *Senecio*, or the North American species of it, I do not see how I could avoid rejecting this as a *nomen nudum*. All that could save it, by any possibility, would be the line and a half of description, which I infer to have been drawn from the Flodman specimen from Montana which Mr. Rydberg cites. The pretended synonym "*S. aureus*, var. *croceus*, Gray" avails nothing whatever. No adequate description of such a variety was ever given. Dr. Gray applied the name, after his usual way, to a considerable aggregate of things belonging to what Mr. Rydberg himself would regard as very distinct species. They were designated merely as having saffron-colored or copper-colored flowers. In some it was conceded that the rays only were

saffron-colored; in others all the corollas, both of disk and ray, were thus colored, while in some there were no rays present, and the disk was red. In view of the fact that *S. aureus*, as Gray in 1863 regarded it, was an aggregate of some dozen or two of species, as Mr. Rydberg and I understand them, what reason or sense can there be in one's pretending—as Mr. Rydberg most certainly does pretend—to make Dr. Gray's *S. aureus*, var. *croceus*, the equivalent of some one particular species? If Gray had indicated some one particular form of his numerous red-rayed ones as the type of his variety, and had then given it something of a description, the case would have been very different. But let us assume that Hall & Harbour's n. 332 may possibly stand as typifying true *S. aureus croceus*. What then? Well; first of all, the mentioning of a type specimen which has never been described does not constitute publication. A name printed with only that kind of a clew to the form is but a *nomen nudum*. Secondly; Gray in the place cited admits that just this n. 332 of said distribution, including Parry's earlier n. 408, is made up of a diversity of things, all at agreement in that some or all the corollas, though confessedly varying much in shade, are of some color more red than yellow. Thirdly; the only sheet of Hall & Harbour's n. 332 existing in Washington, though containing five or six specimens in excellent condition, exhibits not one with rays of a deeper color than light-orange. Yet, the same thing, specifically, which Hall & Harbour's n. 332 in the U. S. Herbarium represents, has been seen by me again and again with corollas as dark as what Gray calls "copper-colored;" and I know it well, from certain localities, with rays not only pure yellow but even rather light yellow. All through the Rocky Mountains, and westward to the Sierra Nevada, occur a very considerable number of allies of *S. aureus*, in every one of which the corollas vary from yellow to deep-orange or saffron-color. What, then, is *S. crocatus*, Rydb.? It waits for a description by which a botanist can identify

it, and in default of that, it remains as far as publication is concerned, little if at all better than a name only.

S. Wardii. Dwarf and compactly tufted, barely 3 inches high, herbage glabrous, slightly succulent: basal leaves erect, obovate-lanceolate, entire or crenate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, on petioles twice as long: bracts or reduced leaves of the scapiform stems triangular-lanceolate, sessile by a very broad base, the margin more or less deeply crenate: heads small, numerous, short-pedicelled, forming a rather dense and nearly hemispherical cluster; reduced bractlets of the pedicels lanate on the margin (the only pubescence): involucral bracts 10 or 12, broadly and somewhat elliptically lanceolate: rays few and broad, 3 or 4-nerved.

Collected somewhere in Utah, in the year 1875, by L. F. Ward; the specimen deposited in the U. S. Herbarium and labelled "*S. aureus*, var. *alpinus*, Gray," which means *S. petræus*, Klatt; but the plant is no near ally of that species. It may or may not be alpine.

S. petrocallis. *S. petrophilus*, Greene, Pitt. iii. 171. This is a second attempt on my part to assign to the Rocky Mountain *S. petræus*, Klatt, a tenable name. Even *S. petrophilus* had been used by Klatt, apparently in the early nineties, for another species.

S. milleflorus. Nearest *S. atratus*, similarly tufted, more than twice as large, the leafy and very copiously floriferous stems a yard high more or less: whole plant hoary with a loose but persistent tomentum: leaves of sterile basal shoots commonly a foot long including the short petiole, lanceolate and oblong-lanceolate, mucronately acute, rather remotely dentate, the teeth callous-pointed; cauline leaves half as large, lanceolate, sessile, more deeply dentate: heads excessively numerous in a very large compound and somewhat fastigiate cyme; involucres narrow, cylindrical, about

12-flowered, bracts about 8, linear, with acute blackish tips, otherwise green: rays 3 or 4: achenes small, glabrous.

Stony dry river beds about Pagosa Springs, Colorado, 27 July, 1899, C. F. Baker. A fine large species, remarkable for the great number of small cylindric heads; the species intermediate, in a way, between *S. atratus* of the middle Rocky Mountains and *S. umbraculifer* of Chihuahua, northern Mexico.

S. IMBRICATUS. Allied to the last, but stems perhaps solitary, 2 to 5 inches high, bearing few and somewhat ample leaves and a terminal corymb of few heads: lowest leaves lanceolate, acute, mucronately dentate or denticulate, tapering to a short usually somewhat winged petiole; cauline not much reduced in size and similar in outline, dentation, etc., but broad at base and amplexicaul, both faces of all, as well as the stem, hoary-tomentulose: involucres rather broad and short, with broad lanceolate conspicuously black-tipped bracts and several unequal but uncommonly large equally black-tipped calyculate bractlets at base: rays 8 or 10, elongated, light-yellow.

Collected at the Reindeer Station, Port Clarence, Alaska, 9 Sept., 1894, by Mr. James T. White, the specimens deposited in the U. S. Herbarium. Species remarkable for the large size of the calyculate bractlets, these giving the involucre as a whole the appearance of being somewhat imbricate.

S. SCOPULINUS. *S. Bigelovii,* var. *Hallii,* Gray, Proc. Philad. Acad. 1863, p. 67. *S. Bigelovii* var. *monocephalus,* Rothr. Wheeler Rep. 178. This plant, common in the mountains of middle and southern Colorado, is thoroughly distinct from *S. Bigelovii* by its peculiar pubescence of many-jointed and crisped hairs. True *S. Bigelovii* is still unknown except from southern New Mexico, and is of very different aspect, with thin and not at all succulent deep-green herb-

age, usually no trace of any pubescence, but this consisting of short stiff straight hairs whenever present. This, the real *S. Bigelovii*, was distributed by Mr. Wooton, from the White Mountains of New Mexico, as *S. Rusbyi*, an error for which I am solely responsible. The species is nearer to *S. Rusbyi* than it is to *S. scopulinus*, which latter I have until recently assumed to be typical *S. Bigelovii.*

S. CHLORANTHUS. Allied to the preceding and to *S. Bigelovii*, taller than either, commonly a yard high or more, leafy throughout, deep-green and glabrous, or occasionally with a scanty indument of many-jointed deflexed hairs on the peduncles and about the insertion of the upper leaves: lowest leaves narrow-lanceolate tapering to a winged petiole which is at base dilated and almost sheathing the stem, the whole 6 to 10 inches long; the middle cauline spatulate-lanceolate and, like the broad-based ovate-lanceolate uppermost, sessile; all very acute or acuminate, evenly and sharply denticulate: large and long-peduncled nodding heads often as many as ten and forming a strict raceme, sometimes one or two only: involucres and greenish flowers much as in *S. Rusbyi* or *S. Bigelovii.*

Mountains of southern Colorado, near Pagosa Peak, at 9,500 feet, 15 Aug., 1899, collected by C. F. Baker. I should have referred this, though with doubt, to *S. Rusbyi*, had I not detected the characteristic pubescence in some of the specimens. *S. Rusbyi*, quite different from this in inflorescence, the raceme being long, strict and almost naked, has also traces of a pubescence, but the hairs are so short and stiff as to be scaberulous.

S. PUDICUS. *S. cernuus*, Gray, not of Linn. f., is another member of this group of Rocky Mountain species with nodding heads; but the name at first assigned by Dr. Gray, being a homonym, is to be avoided.

S. AMPLECTENS, Gray, Sillim. Journ., ser. 2, xxxiii., 240; but in part only of Syn. Fl. 384. At least four species are confused with this in the *Synoptical Flora;* but one conversant with Rocky Mountain botany will find no difficulty in determining which one of these is the original *S. amplectens;* for at the time when this was published Dr. Gray knew none of the others, hence his diagnosis is clear. The associations of the plant have not, I believe, hitherto been mentioned. It occurs only in open woods, or along their borders, well below timber-line, while all those here separated from it are alpine, even almost high-alpine, occurring only far above the limit of trees. *S. amplectens* is always tall; its large long-rayed heads are very abruptly-nodding, their involucres almost black with a dark pubescence, of which no trace is ever found on any of its allies; the excessively long rays are 5-nerved. As to the subterranean parts, its rootstock is quite horizontal, superficially seated, and from this the stem arises very decumbently.

S. TARAXACOIDES. *S. amplectens* var. *taraxacoides*, Gray, Proc. Philad. Acad. 1863, p. 67, but in small part only. Dwarf, the very leafy and usually monocephalous stem only 2 or 3 inches high, very erect from an erect rather stout and fleshy rootstock, this short-jointed and bearing copious white rather soft and fleshy elongated roots: whole herbage, the involucre excepted, permanently arachnoid-tomentulose: leaves 1½ to 2 inches long, variously simulating those of a *Taraxacum* in outline and dentation, though the mostly triangular teeth are seldom runcinate, the whole leaf margin commonly revolute: head only horizontally nodding: involucre dark-green, glabrous except a few white arachnoid hairs: rays ½ inch long, light-yellow, 4-nerved.

Dr. Gray's var. *taraxacoides* was based on two very different plants, the other being wholly glabrous, and much more nearly related to *S. Soldanella* than to *S. amplectens.* I choose the present one as type of my species *taraxacoides* for the

reason that it is much more suggestive of *Taraxacum* than is the other; but it is by no means as common as the next. I never met with it in my own explorations, and so have never seen it growing, though the other I am familiar with in the field. The specimens of *S. taraxacoides* examined by me recently are the following: Hall & Harbour's n. 317, as represented in the U. S. Herbarium (contains one specimen of this, and two of the one next to be described!): Pike's Peak, at 13,500 ft., Chas. S. Sheldon, 1884, also from the same locality, by Canby, in 1895: Carl F. Baker, Cameron's Pass, in northern Colorado, at 11,500 ft., in 1896; Theo. Holm, at 13,000 ft. on James' Peak, 1899.

S. Holmii. *S. amplectens*, var. *taraxacoides*, Gray, l. c. in part. Commonly 6 inches high, the stoutish stems mostly several from a branching rootstock, leafy at base only, the pedunculiform stem with only 1 or 2 reduced leaves; stem and petioles of a vivid red-purple at and near the base, the whole thickish and somewhat fleshy herbage appearing glabrous, a lens revealing a very sparse and minute hirtellous hairiness at base of involucre, on the peduncles and occasionally the leaf-margins: leaves from obovate to obovate- and oblong-lanceolate, callous-dentate or denticulate, 1½ to 3 or 4 inches long, on petioles nearly as long: heads 1 to 4 or 5, large and nodding: rays ¾ inch long or more, 5 to 7-nerved.

This, as I have intimated above, is very distinct from my *S. taraxacoides*, though forming perhaps the greater part of Gray's variety of that name, and is much nearer *S. Soldanella*, from which its larger size, long showy rays, and very dissimilar foliage, abundantly distinguish it. It is known only from Colorado and Wyoming. Mr. Patterson's 81, from Gray's Peak, in 1885, well represents it. I take pleasure in dedicating it to Mr. Holm, who has lately collected it, while engaged in a prolonged field study of the Colorado alpine flora.

S. SERIDOPHYLLUS. Near *S. amplectens*, similarly thin-leaved, but never in any degree floccose, glabrous throughout except a minute and sparse pubescence of hirtellous hairs at base of involucre and along the margins of the leaves, or even this wanting and the plant wholly glabrous: stems slender, 5 to 10 inches high, leafy, bearing at summit 1 to 3 slender-peduncled large slightly nodding heads: leaves oblong-lanceolate, 3 to 5 inches long including the short petiole, variously toothed or denticulate, sometimes coarsely laciniate-toothed, occasionally almost entire: heads about ¾ inch high: rays light-yellow, ½ inch long, 3 to 5-nerved.

This is one of Dr. Gray's later additions to that aggregate of his which was named *S. amplectens*, var. *taraxacoides*; though it is really less unlike the original *S. amplectens*, and far enough removed from that. It is Mr. Watson's n. 679, from the Clover Mountains, Nevada, at least as represented in the U. S. Herbarium, where also I find it in specimens collected by Mr. Jones at Marysvale, Utah, at 11,700 feet, it being his numbers 5929 and 5958. The above description, however, is drawn from my own collecting in 1896, on the Ruby Mountains, Nevada; and these specimens exhibit more distinctly than others a characteristic short hard rootstock, with an investiture of chaffy leaf-bases which persist from the foliage of other years. Those of *S. soldanella*, *taraxacoides*, *Holmii* and the rest are always elongated, fleshy and naked. This more westerly plant is strictly alpine, though with the thin foliage of the subalpine *S. amplectens*.

S. LACTUCINUS. Near the last, but the tufted stems usually a foot high or more and leafy throughout, the basal leaves smaller and on greatly elongated petioles; branches of the rhizome or caudex ascending, hard in texture and more or less fibrous-coated by remains of the petioles of a former season, the fibrous roots few, much more wiry: herbage glabrous: radical leaves from obovate to elliptic-oval, very

closely, deeply and sharply toothed or sometimes almost laciniate; cauline elliptic-lanceolate, 2 or 3 inches long including the short winged petiole, the margin as in the others: heads, usually 3 or 4, large, nodding on erect and elongated peduncles: rays ¾ to 1 inch long, deep-yellow, 7 to 9-nerved.

On stony alpine slopes at 12,000 feet in the mountains of Colorado near Pagosa Peak, C. F. Baker, 9 Aug., 1899. It in a measure unites the subterranean characteristics and tall leafy stem of *S. amplectens* and the thick foliage of *S. Holmii*, though in point of leaf-outline and indentation, and peculiarities of the flower, it has enough characters that are all its own.

S. OCCIDENTALIS. *S. Fremontii*, var. *occidentalis*, Gray, Bot. Calif. Surv. i. 118. Describing this as a variety the author named characters enough to have warranted its being placed in specific rank; but in addition to those given at the place cited, I have to say that the achenes, puberulent in *S. Fremontii*, are in this plant of the Sierra Nevada perfectly glabrous, and also longer and narrower than in *S. Fremontii*. It is quite possible that other Pacific coast plants besides *S. occidentalis* are to be segregated from *S. Fremontii* as hitherto accepted; and the following from the Rocky Mountain region are easily distinguishable from it.

S. CARTHAMOIDES. Stems tufted on a persistent yet scarcely more than herbaceous caudex or rootstock, decumbent and nearly leafless below, or the lower leaves at least much smaller and more sparse, the whole plant seldom a foot high, very leafy above the middle: leaves variously obovate and obovate-oblong, commonly 2 inches long or more, sessile by a broad somewhat hastate and clasping base, the margin coarsely and doubly dentate, the teeth callous-tipped: heads ½ inch high, erect, subcampanulate,

either very short-peduncled or subsessile and scarcely exceeding the subtending foliage, solitary or 2 or 3 at the end of the main stem, certain lateral and widely divergent branches, equalling the main axis and very leafy, usually sterile: rays short, not as long as the diameter of the head: achenes short, canescent with a minute strigulose pubescence.

Alpine on the mountains of southern Colorado; collected by me in 1896, on Little Ouray Mountain, at Marshall Pass, and now, in 1899, obtained in quantity by Mr. C. F. Baker, near Pagosa Peak, at 12,000 feet altitude. A decidedly succulent plant, exhibiting an excess of large carthamus-like foliage, and very few heads. The achenes in *S. Fremontii*, if I rightly identify this as the plant of northern Colorado and adjacent Wyoming, are distinctly angular, and puberulent between the angles; but in *S. carthamoides* the angles, if present at all, are hidden by the dense uninterrupted indument of short appressed but stiffish hairs.

S. BLITOIDES. Allied to the preceding, quite as tall, the numerous stems from a firmer and more woody rootstock, all the branches floriferous and the heads on rather long and slender peduncles borne well above the leaves: leaves an inch long or more, from spatulate-oblong to obovate-oblong, sessile and half-clasping, coarsely dentate: heads on bracted pedicels of 2 or 3 inches long, rather more than $\frac{1}{2}$ inch high, the diameter less, the rather numerous rays well elongated, somewhat over $\frac{1}{2}$ inch, deep-yellow: achenes narrow, slightly contracted at apex, very glabrous and striate.

Collected at 12,000 feet on Mt. Elbert, middle Colorado, 28 Aug., 1899, by Mr. Theo. Holm; the species intermediate, as it were, between true *S. Fremontii* and *S. carthamoides*, yet with perfectly glabrous achenes. It may exist among other collections from Colorado, but I have not hitherto met with it except in this recent collection by Mr. Holm, who

has also brought, though from another locality, what seems to be genuine *S. Fremontii*, a much smaller plant than this, and with achenes puberulent between the angles.

S. INVENUSTUS. Stems much branched and apparently depressed, only 4 to 6 inches high, clustered on a thick hard and distinctly subligneous rootstock, very leafy from the base up, and more than usually angular by decurrent lines from the leaf-bases: leaves $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, spatulate-oblong, doubly and somewhat laciniately toothed, the teeth not callous-tipped, and the whole margin thinly scaberulous under a lens, the upper surface showing a few scattered hairs: heads 2 to 5, very short-peduncled at the ends of the main branches, the lateral branches short, densely leafy, flowerless: involucres narrow and subcylindric, nearly $\frac{1}{2}$ inch high: rays few, about as long as the diameter of the head: achenes striate, glabrous.

Known to me only from 12,000 feet on the mountains about Pagosa Peak, Colorado, where it was obtained by C. F. Baker, 23 Aug., 1899.

NEW SPECIES OF COLEOSANTHUS.

C. HUMILIS. Stems solitary or several together arising from a horizontal woody caudex or rootstock, mostly 6 or 8 inches high, some monocephalous, others with 3 to 5 corymbose heads: leaves from ovate-lanceolate to linear-lanceolate, about $\frac{3}{4}$ inch long, entire or rarely with 2 or more serrate teeth, distinctly 3-nerved beneath, both faces green and glandular-scabrous, the stem white, similarly scabrous: involucres about $\frac{1}{2}$ inch high, short-peduncled; bracts about 4-nerved, all acute, the inner linear: achenes dark-brown, hispidulous along the ribs.

Sandy hills, growing with *Pinus edulis*, at Arboles, southern Colorado, collected 21 June, 1899, by C. F. Baker, the

specimens barely in flower at that date; only a few heads exhibiting well formed though immature achenes. The species is allied to *C. oblongifolius* and *linifolius*, but differs from both in its greener and less viscidulous foliage, and especially by its underground growth, most of the stems appearing to rise singly from the horizontal and mostly subterranean woody part. Nor are the leaves at all feather-veined as in its near relatives.

C. ABBREVIATUS. *Brickellia oblongifolia*, var. *abbreviata*, Gray, Bot. King Exp. 137. This is an alpine undershrub, extremely different from *C. oblongifolius* in habit, the tufted stems being very slender and depressed, even almost prostrate; the leaves are much thinner, broader, and commonly saliently toothed; also the outer bracts of the involucre exhibit broad green herbaceous tips, such as are not found at all in others of this group. These points of difference, along with the peculiarity of the achenes mentioned by Gray, seem to constitute every warrant for placing this in the rank of a species. It was seen and collected at the original station near the summits of the West Humboldt Mountains, by myself, in the summer of 1894.

C. VERBENACEUS. Shrubby, the flowering branches 2 feet long: leaves coriaceous, 2 inches long, oblong-cuneiform, entire below the middle, with a few pairs of coarse serratures toward the acute apex, dark-green and shining above, though with some scattered pubescence, the lower face 3-nerved and reticulate as well as hoary with a loose subtomentose hairiness: heads one in each axil of the uppermost leaves, ½ inch high, on pedicels of their own length, involucre narrowly turbinate, its bracts very evenly imbricated, elliptic-lanceolate, with acuminate and very sharply pointed apex, all about 5-nerved: achenes villous.

I have this plant, and have seen it in other herbaria, under the name of "*Brickellia oliganthes*," from which it

is easily distinct. It is Parry & Palmer's number 355, from San Luis Potosi, Mexico, 1878, as far as specimens under that number are known to me.

C. DENSUS. Stems several from a thick knotted woody crown or root, 1 to 2 feet high, leafy and floriferous almost from the base: leaves mostly alternate, broadly lanceolate, 1½ inches long, subsessile, lightly serrate or crenate, subcoriaceous, rugose-reticulate, canescent with a rather coarse and rough tomentum: heads subcylindric, ½ inch high or more, nearly sessile by twos and threes in the axils of the leaves; bracts of the involucre few, the short outer ones oblong-lanceolate, the inner oblong-linear, all acute, 5-nerved: achenes villous.

On rocks in the vicinity of Chihuahua, Mexico, C. G. Pringle, n. 635; distributed under the manuscript name *Brickellia oliganthes*, var. *crebra.*

C. POLYANTHEMUS. Apparently tall, stout and shrubby, the mere flowering panicle 2 feet long and more than 1 foot broad: lower leaves not seen, those at base of panicle ovate and oblong-ovate, 1 to 2 inches long, subcoriaceous, rather remotely serrate-toothed, scabrous-pubescent and rugose-veiny: branches of the panicle virgate-racemose, the turbinate involucres ½ inch high or more, on pedicels as long or longer, about 20 or 25-flowered, bracts many, much imbricated, from oblong-oval to oblong-linear, all obtuse but cuspidately mucronate, evenly about 7-nerved: achenes very villous.

Rio Blanco, State of Jalisco, Mexico, Edw. Palmer, 1886, number 59.

A Decade of New Pomaceæ.

Amelanchier crenata. Stems low, clustered and bushy, the branches very stout, rigid and divaricate, the bark ash-gray: leaves subcoriaceous even at flowering time, nearly orbicular, ½ to ¾ inch in diameter, evenly but rather lightly and coarsely crenate all around the margin except the basal portion, both faces when young pale with a light tomentum, neither face notably veiny: flowers 3 to 5, in short subcorymbose short-peduncled clusters; the peduncles and pedicels as well as the calyx villous or villous-tomentose: segments of the calyx-teeth triangular, about equalling the tube: petals narrowly obovate-spatulate, creamy-white, but red externally before expansion: filaments very short, slightly subulate-dilated.

On rocky declivities near Aztec, New Mexico, 23 April, 1899, C. F. Baker; the species altogether peculiar in the crenate character of its leaf-indentation.

Amelanchier polycarpa. Small branching tree, the branches not stout, though numerous and short, with red bark and no trace of pubescence: leaves small, the largest barely an inch long, round-obovate, deep-green above, paler beneath, remarkably veiny on both sides and wholly glabrous, deeply and rather sharply serrate from below the middle, the base entire, often subcordate; petioles rather slender but mostly shorter than the blade: flowering twigs very short but numerous, the racemes few-flowered: calyx, and even the summit of the ovary within it, perfectly glabrous: fruit depressed-globose, crowned by a short calyx-limb and its triangular-lanceolate segments.

Collected at Piedra, southern Colorado, 10 July, 1899, by C. F. Baker, who records that it grows on low level lands

and bears a great abundance of fruit, as the specimens well show. In the apparently total lack of pubescence the species recalls *A glabra* of the subalpine Sierra Nevada, though the two are not very intimately allied.

Amelanchier rubescens. Arborescent and 10 or 15 feet high, or bushy and only 4 to 6 feet; rather intricately branched and the branches very stout, short and divaricate, the bark after the first season of a dark ashy gray: leaves small, seldom an inch long, ovate, acute, serrate-toothed almost throughout, only the rounded base entire, canescently tomentulose on both faces, the short petiole and also the growing branchlets and inflorescence more densely and villously pubescent: racemes few-flowered and subcorymbose: calyx with lanceolate erect teeth rather longer than the tube, the whole exterior as well as the inner face of the lobes hoary-tomentulose: petals small, about $\frac{1}{3}$ inch long, reddish externally in the bud, as is also the calyx.

In arroyos and among the hills about Aztec, New Mexico, 24 April, 1899, C. F. Baker. If I mistake not I have seen the same from somewhere in northern Arizona. The species is remarkable for its small leaves and their prevailingly ovate outline. The fruit is not known.

Amelanchier Bakeri. Shrub or small tree, the stems tufted, and with short stout rigid divaricate branches of the last, but the more reddish bark puberulent even to the second and third years' growth: leaves very short-petioled, orbicular, 8 to 10 lines long and of the same breadth, subcordate and entire at base, above the middle and across the broadly rounded or almost truncate apex coarsely and evenly serrate, both faces sparsely tomentulose; stipules villous, and growing twigs both somewhat villous as well as tomentose: racemes subsessile, short and dense, small-flowered: calyx villous-tomentose, the triangular-lanceolate segments as long as the tube and closely reflexed: petals white, about 3 or 4 lines long: fruit not seen.

Collected at Los Pinos, southern Colorado, 16 May, 1899, by C. F. Baker. Much like the northern *A. alnifolia* as to leaf-outline, but totally unlike it by its short, stiff, spreading branches, puberulent branchlets, and small leaves and flowers.

A. GORMANI. I assign this name, in commemoration of Mr. M. W. Gorman's abundant and fruitful researches in Alaska, to the Alaskan shrub, or small tree which has passed under the name of *A. alnifolia.* It is distinguished from that species by a more slender habit, larger and relatively longer oval, or oblong-obovate slender-petioled leaves, its long loose perfectly glabrous racemes, and a very characteristic calyx. This organ is externally quite glabrous and distinctly glaucous; its limb is notably dilated under the insertion of the petals into a broad saucer-shaped rim; and the lanceolate segments, either erect or somewhat spreading, are longer than all the rest of the calyx, and are tomentulose within. The fruit in this species makes an approach to the pyriform in outline and is glaucous.

My best specimens of this very beautiful species were obtained by Mr. Gorman, at Yes Bay, Alaska, in 1895, the flowers having been gathered on the 16th of June, the fruits on the 6th of September.

SORBUS DUMOSA. Shrub with clustered but slender and very erect stems 5 to 8 feet high; bark red, white-dotted and glabrous, except on the growing shoots, in these rather densely puberulent or pubescent with short white hairs: leaves small, only 3 to 6 inches long and the leaflets in mostly 5 pairs, the rachis villous-pubescent, but leaflets quite glabrous on both faces, oblong or oblong-lanceolate, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, evenly and lightly serrate from below the middle, the serratures rather appressed, indistinctly gland-tipped, the apex of the leaf abruptly attenuate to a long slender point: winter buds canescently villous: cymes small, narrow, low-pyramidal rather than flat-topped: pedicels and calyx puberulent.

A somewhat local, but very distinct species, known to me only from Mt. San Francisco, northern Arizona, where I collected it in flower, 10 July, 1889. It exists in the U. S. Herbarium from the same locality as collected by Edw. Palmer in 1869, and by Mr. McDougal, 7 July, 1899. From the date of its flowering in that low latitude it will correctly be inferred to be subalpine. Its nearest affinity is the next species, and both are related to *S. Americana* rather than to the Pacific coast *Sorbus* species.

Sorbus scopulina. Shrub 8 to 12 feet high, not slender; the growing branchlets very sparsely villous or hirsutulous: leaves 5 to 7 inches long, the rachis glabrous, or somewhat pilose at the joints; leaflets in 6 or 7 pairs, glabrous on both sides, about 1½ inches long, oblong-lanceolate, very acute, deeply and often doubly serrate from base to apex, the serratures rather salient, not at all glandular or callous at tip: scales of the winter buds villous on the margin, otherwise glabrous: ample cyme more flat-topped; pedicels and base of calyx sparingly villous under a lens.

Mountains of northern New Mexico (Heller's n. 3711 from Santa Fé Cañon, 8,000 ft., June, 1897), Colorado (C. F. Baker, at 9,000 ft., near Pagosa Peak, 10 Aug., 1899; also the same from Four-mile Hill, Routt Co., 8,500 ft., 1896), and Utah (L. F. Ward, east of Gunnison, 9,000 ft., 1875; and Marcus Jones, at Provo, 8,000 ft., 3 July, 1894). This has been referred, usually, to *S. sambucifolia*, which is a native of Kamtschatka; but it has as often been included in *S. Americana*, to which it is more nearly related, indeed; but many characters distinguish it from the typical form of that species. I know not how much of the more northerly or northwesterly *S. sambucifolia*, i. e., of Montana and Idaho, may be included in *S. scopulina*. My types are the specimens of C. F. Baker and Mr. Heller.

Sorbus subvestita. Bark of mature branches dark-red-brown, scarcely dotted, of growing ones canescently tomentulose: leaves 4 to 6 inches long, the leaflets in about 8 pairs,

oblong, acutish, simply serrate from above or below the middle, the base entire, notably inequilateral, the lowest pair very small, of one-fourth or one-fifth the size of the others, the largest 1½ inches long, glabrous above, tomentulose beneath, as also the rachis: winter buds densely tomentose: cyme short-peduncled, ample.

This species, exceedingly well marked by its peculiar leaflets and indument, especially of the winter buds, is known to me only in Sandberg's flowering specimens from "Woods, in St. Louis Co., Minnesota," collected in 1890.

Sorbus occidentalis, Greene, Fl. Fr. 54, as to the name only. *Pyrus occidentalis,* Wats. Proc. Am. Acad. xxiii. 263, excluding the Californian specimens and habitat. Mr. Watson's diagnosis was drawn mainly from specimens of an alpine shrub of the higher mountains of Oregon and Washington. This, the type of the species, is marked by numerous elongated (linear-oblong) dots on the puberulent branchlets; by long-peduncled leaves consisting of four or five pairs of very obtuse leaflets which usually appear to be entire except at and near the apex; and by pyriform coral-red glaucescent fruits.

These are the salient characters, as they appear in specimens collected by myself on Mt. Rainier in 1889.

Sorbus Californica. *S. occidentalis*, Greene, Fl. Fr. 54, as to the character, and Californian habitat. Shrub or small tree many times larger than the last; branchlets glabrous, neither reddened nor notably dotted, the dots when present not elongated: leaves short-petioled; leaflets sharply and often doubly serrate almost or quite from base to apex, mostly in 5 or 6 pairs: fruits of a more scarlet or crimson red and not glaucescent.

Common at middle elevations in the Californian Sierra, far below even the subalpine regions, and not remote from the heated plains of the interior; an excellently distinct species, as compared with true *S. occidentalis,* with which, however, Mr. Watson confused it.

A Fascicle of New Papilionaceæ.

Lupinus aduncus. Low decumbent perennial, the stems seldom exceeding a foot in height inclusive of the single terminal raceme; whole plant silky-canescent: leaflets mostly 7, about 1 inch long, narrowly oblong-lanceolate, obviously mucronate-cuspidate: raceme subsessile, quite long for the plant, the small flowers in distinct whorls: calyx with a short but prominent and almost hooked spur: corolla about 4 lines long, deep-blue, the subequal petals notably striate-veined, the banner with a white spot in the middle soon changing to reddish-purple; keel shorter than the wings, not falcate but rather stout-pointed and blunt, naked.

A decidedly handsome lupine of dry ravines among the sandy hills at Aztec, New Mexico, collected by C. F. Baker, 2 May, 1899.

Lupinus Bakeri. Perennial, the tufted stems erect, very stout and somewhat fistulous below, 2 or 3 feet high, pale and ashy or somewhat silvery pubescence, the lower part of the stem villous-hirsutulous with short spreading hairs; lower nodes of stem apparently leafless and having only large stipular appressed scales: leaflets 7 to 9, about 1 to 1¾ inches long, elliptic-lanceolate, acute, almost equally pubescent on both faces: raceme solitary, rather short, subsessile, the flowers of middle size and in rather distinct whorls, blue, with the usual spot on the banner at first white, then red or purple: banner notably shorter than the other petals: keel short and nearly cymbiform, completely enfolded by the wings, densely woolly-ciliate throughout.

Growing in large dense bunches in oak thickets at Los Pinos, southern Colorado; collected 31 May, 1899, by Mr. Baker.

LUPINUS INGRATUS. Related to *L. decumbens*, less branching, with few and subsessile racemes of very small and crowded flowers; all parts glabrous except a fine silky indument on the calyx and pedicels and the youngest growing parts: leaves short-petioled and crowded; leaflets 9, oblong but cuneately tapering to the base, obtuse, cuspidate-mucronate: flowers evidently verticillate on close inspection, but crowded into a dense uninterrupted narrow spike, the corolla only 3 lines long, white or sordid, with no tinge of blue or purple; petals subequal, but the falcate naked keel with its pointed tip exserted: pods small, quadrate-oblong, silky-villous, 4-seeded.

Frequent in low grassy lands at Chama, New Mexico, 2 Sept., 1899, Mr. Baker. A homely species, but with a fair exhibit of specific characters.

LUPINUS NEO-MEXICANUS. Perennial, the tufted and suberect stoutish stems 2 feet high or less, these and the petioles pilose, or sparsely hirsute: leaflets about 7, oblong-lanceolate, acute, 1 to 1½ inches long, apt to be conduplicate, the upper face thus concealed in the dry specimens, but apparently glabrous, the margins and lower face rather strongly somewhat strigose with long but not very rigid straight hairs: well-developed solitary raceme short-peduncled, rather lax, the flowers seldom obviously verticillate; rachis, pedicels and calyx densely villous-hirsutulous but the indument short: corollas nearly ½ inch long, purple, the banner relatively small, little more than half as long as the wings, keel not longer than the wings, of exactly broad-lunate outline, naked.

About Silver City, and in foothills of the Pinos Altos Mountains, southern New Mexico, collected by the writer in 1877 and again in 1880; no other specimens now at hand. It was at that time called *L. Sitgreavesii* by Mr. Watson, but is less related to the type of that species than that is to several older ones that might be named.

Lupinus Helleri. Perennial, the rather rigid suberect scarcely branching stems 2 or 3 feet high inclusive of the rather elongated and showy subsessile raceme, the whole herbage silvery-canescent with a very fine appressed-silky indument: leaflets 7 to 9, about 1½ inches long, oblanceolate-linear, acute, apt to be conduplicate, the upper face greener and more sparsely silky-hairy: solitary raceme 6 to 10 inches long exclusive of the short peduncle, in its undeveloped state showing an imbricated series of ovate-lanceolate acuminate erect and closely appressed bracts; flowers scarcely whorled; calyx densely silky, very distinctly spurred; petals blue-purple, subequal, about 5 lines long, the banner with a few silky hairs on the middle of the back; keel somewhat falcate, scantily ciliate in the middle and toward the apex with tortuous hairs.

This is Mr. Heller's number 3557 of my set of his New-Mexican plants of 1897, taken from "a cañon one mile southeast of Santa Fé," and distributed for "*L. argenteus*," a Purshian species of most uncertain identity, never adequately described by that author, nor positively identified by any subsequent writers on our lupines, on which account the name itself ought to be dropped. Mr. Heller's plants differ specifically from the common *L. decumbens* of Rocky Mountain plains and hills by its canescent silkiness, unbranching stems, longer raceme of larger flowers, and its spurred calyx.

Lupinus myrianthus. Size of the last, but the stems freely branching above and the racemes several, very dense and the flowers of the smallest; stem purplish and only sparsely strigulose; petioles slender and the 7 to 9 leaflets narrowly oblanceolate, acutish, perfectly glabrous above, finely and rather densely strigulose beneath: racemes 2 to 5 inches long, subsessile, in bud showing bracts with attenuate and spreading tips; flowers violet, verticillate but the whorls closely contiguous; pedicels and calyx densely vil-

lous; corolla less than 3 lines long, the petals equal, the short and broad keel delicately ciliolate.

This is another of the allies of *L. decumbens*, but most distinct by its excessively numerous very small flowers, appearing in fine close racemes at the ends of all the branches. It may possibly include no small part of the so-called *L. argenteus* of low meadows in Wyoming, Utah and Nevada; but my type specimens are from the meadows about Gunnison, Colorado, and were obtained by myself, 1 Sept., 1896.

Lupinus alsophilus. Tall, branching and small-flowered as the last, with still greener and seemingly glabrous herbage, but leaves fewer, very large and ample; leaflets about 8, those of the middle and lower portion often 3 inches long and ¾ inch broad above the middle, oblong-lanceolate, obtuse, mucronate, pale and glaucescent beneath, green and glabrous above: racemes 2 to 4 inches long, on slender peduncles somewhat shorter: flowers violet, scattered, less crowded than in the foregoing; calyx with very short tube not gibbous; petals equal, 3 lines long, the keel short, broad and blunt, the margin naked: pods densely villous.

In subalpine thickets near the summits of the mountains above Cimarron, Colorado, 30 Aug., 1896, collected by the writer. Remarkable as combining the largest of lupine leaves with almost the smallest of lupine flowers.

Lupinus oreophilus. Perennial, with tufted slender erect or decumbent stems 1 to 2 feet high, not branching, and with a single short raceme of small flowers; the whole plant almost white with a dense silky tomentum: leaflets 7 to 9, the longest 2 inches long, oblanceolate, obtuse, mucronate, the petioles longer than the leaflets: flowers violet, rather distinctly whorled; pedicels and calyx velvety, the latter gibbous or subsaccate at base; petals equal, the banner, and sometimes the wing-petals also, densely villous on the outside along the midvein, keel short but somewhat

falcate, densely woolly-tomentose marginally rather than ciliate.

Dry foothills along the Cimarron River, southern Colorado, 29 Aug., 1896, collected by the author.

Lupinus ammophilus. Perennial but not tufted, the stems arising singly from an extensive system of rather deep-seated horizontal rootstocks; the stem and raceme together ¾ to 2 feet long, but the large raceme mostly longer than the leaf-bearing portion, the whole very stout, somewhat fleshy, and the petioles and basal part of stem rather coarsely hirsute with long white spreading or deflexed hairs: leaflets 8 or 10, cuneate-obovate to broadly oblanceolate, light-green and glabrous above, sparsely hirsute beneath, 1 to 1½ inches long: raceme large and showy; pedicels and gibbous calyx hirtellous: corolla about 5 lines long, the petals subequal, the banner a trifle shorter than the wings, with a yellow spot in the middle changing to dark-red, the petals otherwise purple; keel falcate, the long beak-like tip thinly woolly-ciliate: ovaries densely tomentose.

Sandy bottoms of dry streams at Aztec, New Mexico, 20 April; also at Los Pinos, Colorado, 18 May, 1899, C. F. Baker. A very distinct lupine, bearing no obvious marks of near relationship to any other.

Trifolium nemorale. Caulescent but low, the flowering stems only 3 to 5 inches high, tufted on the branching crown of a stout perpendicular root: lowest leaves on petioles quite equalling the flowering stem; leaflets mostly 3, in some plants prevailingly 4 or 5, obovate-oblong or broadly oblong, ½ to ¾ inch long, very obtuse, sharply serrate-toothed, bright-green and glabrous above, canescently pubescent beneath, but the indument densest along the margin and between the teeth, the leaflet thus appearing almost woolly-margined: heads seldom more than 2, often 1 only, nearly hemispherical, ¾ inch broad; calyx canescently villous, the

subulate subequal teeth rather longer than the tube: petals apparently purplish red with salmon-colored tips.

In open groves of *Pinus scopulorum*, at Los Pinos, Colorado, 17 May, 1899, C. F. Baker. A most interesting and handsome dwarf caulescent clover, whose nearest relatives are in the desert regions of northwestern Nevada and adjacent California. Miss Eastwood, who obtained it near Mancos, Colorado, some years ago, mistook it for the rare *T. Plummeræ* and distributed it under that name.

TRIFOLIUM ATTENUATUM. Near *T. dasyphyllum*, rather larger, less densely cæspitose; herbage greener though with some silky hairiness: leaflets nearly or quite 2 inches long, narrowly linear, acuminate, entire: scapiform peduncles in flower not equalling, in fruit barely a little longer than the leaves: heads hemispherical, few-flowered; bracts at base of outer pedicels somewhat ovate or quadrate, as broad as long, subtruncate, or rarely with an abrupt acumination: calyx-teeth subulate-setaceous, subequal, little longer than the tube: corolla more than ½ inch long, deep red-purple, the elongated and ascending banner well surpassing the other petals and slenderly, almost setaceously, acuminate: pedicels deflexed in age.

Along alpine ledges at 11,500 feet, among the mountains near Pagosa Peak, southern Colorado, 6 Aug., 1899, C. F. Baker. A beautiful new ally of *T. dasyphyllum*, which latter has relatively much longer peduncles and smaller leaves, twice as many and smaller flowers in the head, and these never deflexed, even in full maturity. The slenderly pointed leaflets and banner-petal are also very characteristic, suggesting the name of *T. attenuatum*.

T. ANEMOPHILUM. Equally allied to *T. dasyphyllum*, but dwarf, the whole plant when perfectly developed sometimes no more than 2 inches high: short and crowded foliage and peduncles white with a silvery-silky close indument: bracts subtending the outer pedicels of the head mostly

truncate and tridentate: calyx-teeth equally silky with the foliage, longer than the tube: corolla dark red-purple; banner scarcely exceeding the other petals and quite obtuse.

Bleak hills of southern Wyoming, about Laramie; distributed by Mr. Buffum in 1893 as *Astragalus tridactylicus*, and by Mr. Nelson in 1894 as *Trifolium dasyphyllum*, but thoroughly distinct. It should here be remarked that in *T. dasyphyllum* the bracts subtending the outer pedicels of the flower-cluster are long, slender, entire and subulate-setaceous; very unlike those of either here described as new.

Hedysarum marginatum. Tufted stems erect, 2 to 3 feet high, minutely appressed-pubescent, leafy throughout: leaflets in 5 to 7 pairs, oblong lanceolate and oblong, obtuse, mucronulate, thin, obviously pinnate-veined beneath and pubescent, the upper face glabrous: racemes large and showy, in fruit sometimes a foot long including the elongated peduncle: calyx-teeth shorter than the tube, broadly subulate: corolla rose-purple, about $\frac{3}{4}$ inch long: loments of from 2 to 4 (usually 3) large obovoid joints, these commonly $\frac{1}{2}$ inch long, in maturity exhibiting a thin scarious wing-like margin, the surface strigulose and very irregularly reticulate.

Mountains above Cimarron, southern Colorado, collected by the writer, 30 Aug., 1896; also near Pagosa Springs, Colo., 26 July, 1899, C. F. Baker.

Thermopsis pinetorum. Stems at flowering seldom more than a foot high, often less, mostly simple, rather luxuriantly leafy, the solitary quite sessile spike few-flowered: leaflets of the lowest leaves smaller than their stipules, obovate-oblong, emarginate, those at midway of the stem ample, obovate-oblong, obtuse, 2 or $2\frac{1}{2}$ inches long, on petioles shorter than the inequilaterally cordate-ovate large stipules, all the foliage glabrous above, more or less hairy marginally and beneath: calyx somewhat villous, the triangular subu-

late teeth shorter than the tube: pods ascending or suberect, straight, acute, pubescent or strigulose, about 3 inches long, 10 to 12-seeded.

Common in pine woods of southern Colorado, at considerable elevations; collected by myself, in fruit, below Marshall Pass, 4 Sept., 1896, and by Mr. C. F. Baker, at Los Pinos, in flower, 23 May, 1899. Apparently also extending through the mountain districts to southern New Mexico.

Notes on Violets.

With Plate XII.

I have left too long unpublished the results of some further bibliographical study of two of our common violets: and now, at least one of the nomenclatural corrections consequent upon this piece of research has already gone before the public at second hand; appearing, as it does, upon the labels of that distribution of herbarium specimens of violets which is being made from the U. S. Herbarium, and under the immediate direction of Mr. Pollard. The restoration of the names *V. fimbriatula* and *V. papilionacea* seem to be well warranted, as I shall here endeavor to indicate.

V. fimbriatula, Smith, in Rees' Cycl. 23 Dec., 1817. *V. primulæfolia*, Pursh, Fl. i. 173 (1814), not Linn. *V. ovata*, Nutt. Gen. 148 (1818). To Mr. Nutall, equally with Sir J. E. Smith, must be credited the discovery that what Pursh has mistaken for *V. primulæfolia*, Linn., was a true species and in need of a name; for, while Smith's proposed name for it was published earlier by perhaps a half-year, yet the publication was unknown to Nutall; as is evinced by the fact that he, like Smith, cites the *V. primulæfolia* of Pursh as a synonym. And the actual priority of *V. fimbriatula* over *V. ovata* was never demonstrable until Mr. B. Daydon Jack-

son had given us, in 1895, the precise date of publication of the issue of *Rees' Cyclopedia*, which contained this genus.

V. PAPILIONACEA, Pursh, Fl. i. 173 (1814). *V. cucullata*, Le Conte, N. Y. Lyc. ii. 137 (1828), not of Aiton. *V. communis*, Pollard, Bot. Gaz. xxvi. 336 (1898), not of Wittrock. *V. obliqua*, Schweinitz, Sillim. Journ. v. 60 (1822), and Britt. & Brown, Fl. ii. 447 (1897) in part, (of Hill??), also *V. obliqua*, Greene, Pitt. iii. 142. My reasons for regarding this very common and very beautiful violet as *V. papilionacea*, Pursh, are several. Of course Pursh's diagnoses of his violets are all too brief, often if not always failing to touch the real essential characters by which the species are distinguishable; and I assume that, in the case of *V. papilionacea*, the specific adjective itself is about the best part of the diagnosis. This is true of hundreds of species, that the specific name is the best part of the specific character. The species of violet here under discussion has a more papilionaceous-looking corolla than any other violet known to me. The peculiarly long and narrow keel petal is always concave and boat-shaped, quite as Mr. Holm has shown in the drawing here reproduced (Plate xii), and the side view of the whole corolla is uncommonly like that of a true papilionacea. Moreover, the whole of Pursh's specific character, so far as it goes, is applicable to this species. It is true that, in his notes he describes the corolla as "blue," whereas it is in our plant violet-purple. But a glance at Pursh's pages in respect to the colors of violets reveals the fact that he was always wrong where it was a question of blue or purple; for all the blue-flowered sorts are described by him as with "pale-blue" petals, while all those that have them violet he describes as having them "blue."

His statement that the hairs on the petals of his *V. papilionacea* are yellow was for a time, with me, a weighty objection, though the only objection, against accepting our plant for that species. I can find, in the field, violets in

plenty which exhibit white hairs set in the background of yellowish-white or greenish-white base of the petal, but no yellow hairs. Until the "yellow hairs" are found, I shall no longer believe that such exist, in any blue or purple violet.

About the best imaginable confirmation of the view that *V. communis* of Pollard is the *V. papilionacea* of Pursh exists in my library, in Le Conte's beautiful water-color of what he knew to be the plant of Pursh. I say, of what he knew to be that, because he was on terms of familiar acquaintance with Pursh, and they two were contemporary specialists in the study of our violets. They knew each other's herbaria, and each other's mind in relation to the species of this genus; and although Le Conte at the time of the publishing of his monograph regarded *V. papilionacea* as identical with *V. cucullata* Ait., yet, at an earlier date, at the time when he made the drawing of *V. papilionacea* he labelled it by that name, as the unpublished plate in my possession shows. I think it probable that, at that earlier time he had not decided what was to be considered as the true *V. cucullata.* Indeed, the unpublished figure which he made of what we now understand to be *V. cucullata* he left to the last without a name.

It will be an interesting bit of information to those studying the violets of Maryland and the District of Columbia to know that Le Conte found Pursh's *V. papilionacea* "abundant on the Island of Analostan, in the Potomac River opposite Georgetown," and that the fine drawing of it still extant after the lapse of at least eighty years, was doubtless made here in Washington, from specimens grown on that island; while Pursh's type itself was from no farther away than "near Philadelphia."

V. Missouriensis. Acaulescent, 3 to 7 inches high at early and petaliferous flowering, the stoutish rhizomes ascending and branched, the leaves and flowers quite numer-

ous, the latter from scarcely equalling to somewhat surpassing the former; herbage glabrous and both faces of the leaves closely puncticulate: earliest and small foliage mostly rounded, obtuse, subcordate, as broad as long, those developed along with the corollas from subcordate-deltoid to subhastate-triangular and even triangularly lanceolate, 1½ to 2 inches long, remotely and sometimes obscurely crenate-serrate, the petioles often not longer than the blade: sepals oblong-lanceolate, obtuse, their margins rarely naked, often more or less ciliolate: petals with obovate, obtuse blade, violet or paler and sometimes white, three of them densely bearded with rather long slightly clavate hairs: late and apetalous flowers short-peduncled, horizontal and at least partly subterranean.

A very well defined species, known to me only from Missouri. Its very distinctly trigonous foliage led me at first to refer it to *V. emarginata* notwithstanding certain discrepancies, especially its larger corollas, somewhat ciliate sepals, etc.; but later specimens show distinctly the depressed or partly buried apetalous flowers. My specimens are from Mr. B. F. Bush, Leeds, 19 April, 1895, Courtney, 10 May, 1898, and 30 April, 1899, and from Kenneth Mackenzie, Independence, 24 April, 1898 and Randolph, 23 April, 1899.

Some New or Critical Ranunculi.

R. unguiculatus. Stems solitary, a foot high more or less, from a dense fascicle of short thick and tapering white and glabrous roots: radical leaves 1 or 2 only, erect, elliptical or obovate-elliptic, entire, or remotely and obscurely denticulate, acute, 3-nerved, 2 or 3 inches long, on petioles as long or longer; cauline similar but narrower and short-petioled: flowers 2 to 4 in the smaller plants, twice as many in the larger, each terminating a long naked puberulent peduncle: sepals thin, narrow, some only broadly oblance-

VIOLA PAPILIONACEA, Pursh.

olate, others obovate, spreading: petals about 10, with narrowly oblong or oblong-linear blade tapering to a distinct claw of a half-line long or more, the pit and scale at its summit; the whole corolla, but usually not the calyx, persistent along with the mature fruit: achenes glabrous, narrowly and inequilaterally obovoid, little compressed, beaked by the stout and slightly recurved style, not very numerous and forming only depressed globose or even a hemispherical head.

Common "on sites of old snow banks," at 11,500 feet in the mountains of southern Colorado, C. F. Baker, 28 Aug., 1899. Very large, for an alpine member of the *Flammula* subgenus of *Ranunculus*, and remarkable for its long narrow and distinctly unguiculate petals.

R. ARNOGLOSSUS. Fleshy-fibrous roots as in the preceding, but the plants crowded and forming a tuft, the stems seldom exceeding 6 inches in height; elliptic and elliptic-lanceolate leaves entire, somewhat feather-veined and the veinlets anastomosing, the petioles of even the radical shorter than the blade and dilated below into a broad scarious sheathing base: flowers rather numerous, large for the plant, the petals 5 only, obovate, obtuse, commonly persistent, as also are the sepals: achenes many, crowded, forming a dense globose head.

Subalpine in the Ruby Mountains, eastern Nevada; collected by the writer, 20 July, 1896. The plant is next of kin to *R. alismellus* of the Californian Sierra, but that, as I learned by observation in the field after having published it, has its own peculiar mode of root propagation, by virtue of which the slender flowering plants and their young and sterile offspring form a complete turf along the fertile margins of streamlets. The leaves are characterized by three pretty distinct parallel nerves; and the whole habit is most unlike that of this species of eastern Nevada, which grows in bunches in otherwise barren clayey soil on mountain sides whence the snows have lately receded in July.

R. CARDIOPHYLLUS, Hook., var. PINETORUM. Stems shorter than in the type, seldom 6 inches high, the roots much more strongly and copiously developed; stems and petioles canescently villous; oval leaves commonly subcordate, sometimes truncate at base, the margins crenate: corollas larger than in the type, an inch broad, the round-obovate petals overlapping: head of achenes never more than ovoid, sometimes no more than globose.

"Abundant in pine woods, at Graham's Park, 7,800 feet," southern Colorado, 12 May, 1899, C. F. Baker.

R. EREMOGENES, Greene, var. DEGENER. Much smaller than the type, differing from it in exhibiting several stems from the root, all ascending; the fascicle of roots itself larger, and the roots coarser: head of achenes and their receptacle shorter and more rounded; the individual lacking the thick marginal development which I find universal in the type, though it was not mentioned in my original diagnosis.

Obtained in southern Colorado, in the summer of 1899, by C. F. Baker, perhaps near Pagosa Springs; but the label has been lost.

R. TRIFOLIATUS, Muhl. fide Schlechtendal, Animadv. ii. 30 (1820); *R. fascicularis*, Schl. l. c. as to plate ii, but not of Muhlenberg. It has long been evident to me that the *R. fascicularis* of even the most recent books and catalogues embraces two remarkably distinct species; and I had the impression that one of them was in need of a name. There is a dwarf plant of the North, very early-flowering, which exhibits a large fascicle of almost fusiform fleshy roots; and this appears to be everywhere recognized as *R. fascicularis*, and I think correctly. It seems to range from Massachusetts to Iowa and northward. Then from the vicinity of New York City westward and southwestward along the Alleghanies we have a somewhat nearly related several times larger plant having a large fascicle of long but merely coarse-fibrous roots, which is also

commonly received as the *R. fascicularis*, Muhl. And from a young and not quite typical state of this Schlechtendal figured what he supposed to be *R. fascicularis*. But this plant, with its ample tuft of fibrous roots, its large dimenions, and markedly trifoliolate leaves, was made by Muhlenberg, as Schlechtendal himself attests, a species distinct from *R. fascicularis*, and was distributed by him under the name of *R. trifoliatus*. I believe it is more commonly confused with *R. hispidus;* to which it is, indeed, more nearly allied than to *R. fascicularis*. I myself, while collecting it last season on the higher mountains of western Maryland, supposed it to be some nearly glabrous relative of *R. hispidus;* not at all apprehending that it could have passed with any one for *R. fascicularis*. Yet Dr. Britton has distributed it from Staten Island under this name.

R. APRICUS. Dwarf perennial, near *R. fascicularis*, but even smaller, the fruiting plant often only 2 or 3 inches high; roots equally thick and fusiform but rather shorter: appressed pubescence not obscure: leaves parted into 5, or more commonly only 3, linear or linear-oblong entire or 3-toothed segments, the terminal one often stalked, the others sessile: head of achenes smaller, and the individual achene smaller and relatively thicker than in *R. fascicularis*, broadly margined and indistinctly somewhat tricarinate on the back, the beak very slender, almost straight.

Near Sapulpa, Indian Territory, 29 April, 1895, B. F. Bush. Said to be common on the prairies. Much like *R. .fascicularis* as to the root, otherwise thoroughly distinct.

R. VICINALIS. Near *R. cardiophyllus*, but small, slender, the corollas proportionately large: stem solitary, erect, 3 to 5 inches high, from a fascicle of long and rather fleshy white fibrous roots: lowest leaves of orbicular outline but deeply cleft or parted into about 7 approximate lobes, then again 3-cleft, the middle cauline pedately parted into 7

linear or oblong entire lobes, those subtending the peduncles sessile and of only 3 to 5 linear lobes, all the foliage green and with only some scattered and inconspicuous soft white hairs, or the petioles more obviously villous: sepals ovate, obtuse, villous, merely spreading, purplish-brown at summit and the inner ones adorned with a distinct yellow petaloid margin: petals 5, broadly obovate, very obtuse, 4 or 5 lines long: fruit not known.

At Fort Selkirk on the Yukon River, in dry gravelly soil, 9 June, 1899, M. W. Gorman. A distinct and very elegant species of the group to which *R. pedatifidus* and *R. cardiophyllus* belong; the plants small and slender, the few flowers comparatively large and showy.

New or Noteworthy Species.—XXVII.

Cyrtorhyncha neglecta. Plant larger than in the type-species, often more than a foot high, more delicately herbaceous and the roots fewer and less wiry: leaves more ample and with fewer larger divisions: flowers far less numerous and the inflorescence less corymbose: petals none: stamens very few, commonly 10, forming a single series: head of achenes hemispherical rather than broadly turbinate as in the type: achene shorter and thicker, thickest below the middle and even with a conspicuous dorsal gibbosity just above the insertion.

Occasional in dry ravines about Golden and Morrison, in middle Colorado, at about 6,000 feet altitude, flowering late in May. This is the first *Cyrtorhyncha* that was seen by me in my long course of field-study of Rocky Mountain botany. I obtained it first in 1871, in ravines about Golden City, and was then informed by Dr. Asa Gray that it was the plant of Nuttall. In 1872, when I first visited southern Wyoming, I saw and collected there another so very different from the Colorado plant that I supposed I had now a

second species of the genus. But this, as I learned by further study, was the real *C. ranunculina;* and during the succeeding years of residence in the region I did not again see the Colorado plant. Last spring I requested Mr. E. Bethel of Denver to go in search of it, giving him general directions as to its habitat, and with the result that I soon had fine flowering specimens of my long neglected plant, and later, some thoroughly mature achenes. The species is very well characterized, by its few-flowered inflorescence, apetalous flowers, few stamens, and its short gibbous achenes in a hemispherical head.

Clematis Bakeri. Stems simple, erect, rather slender, 2 feet high, leafy up to the short-peduncled nodding terminal solitary flower; herbage canescently short-villous or villous-lanate; leaves of lower and upper parts of the stem very diverse, the lowest pair oblanceolate, acute, entire, erect and either appressed to the stem or spreading, the next pair commonly pinnately divided in 5 or 7 remote lanceolate entire segments, the others successively much larger and parted into as many long-petiolulate and ternately compound, or finally decompound leaflets, their ultimate segments small and linear-lanceolate: peduncle seldom surpassing and often not even equalling the uppermost pair of decompound leaves: flower about ¾ to 1 inch long, dark-purple; sepals almost glabrous below the middle, white, tomentose toward the reflexed apex.

On hillsides among scrub-oaks, at Los Pinos, southern Colorado, 19 May, 1899, the specimens in flower only. Related to the well-known *C. hirsutissima*, Pursh, of far northern latitudes (commonly known as *C. Douglasii*), but a much taller plant, with smaller flowers, and very different foliage, this in *C. Bakeri* exhibiting extremes of diversity, as I have indicated. The perfectly distinct *C. Scottii* of other sections of southern Colorado is in some sort intermediate, yet of different habit from either of these, and often several-flowered.

GEUM SCOPULORUM. Near *G. strictum*, but usually smaller, always less robust, the tuft of radical leaves presenting two distinct forms, the lowest bipinnate, of rhombic-oval general outline, the rather crowded divisions and subdivisions cuneiform and incisely toothed, those next succeeding lyrate, with few and broad rounded and merely toothed or cleft-segments; base of stem and petioles hirsute; stipules smaller, more rounded than in *G. strictum*: style-tips more hairy.

Type-specimens from "damp, shady thickets" at Piedra, southern Colorado, 14 July, 1899, C. F. Baker. Others, obtained by myself at Sherman, Wyoming, in 1893, want the lyrate form of basal leaf.

ANDROSACE CAPILLARIS. Perennial, the crown of the root branching, forming a dense tuft, bearing numerous filiform scapes all leafy at base, the whole plant 2 to 4 inches high, glabrous except a few scabrous points on the capillary pedicels under the calyx: leaves ovate or ovate-lanceolate, dentate, ¾ inch long including the broad petiole: flowers very many, white, minute; calyx campanulate, the triangular teeth 3-nerved, shorter than the oval or subglobose capsule.

This species, well marked in its vegetative characters, though in flower and fruit so much like *A. filiformis* of the Old World as to have passed under that name with all American authors until now, inhabits the margins of alpine and subalpine streamlets in northern Colorado, northward through Wyoming to Montana. True *A. filiformis* is a tall and slender annual, and is not found in America.

ANDROSACE ARGUTA. Perennial, the short crown of the root branched, but the foliage forming one very dense tuft from the midst of which rise the 12 to 18 scapes: leaves linear-lanceolate, 1 to 1½ inches long, coarsely and somewhat pinnately dentate, roughened above with an indument

of short rigid forked hairs, glabrous beneath: scapes all terminating in a small 5 to 8-flowered subcapitate umbel: calyx glabrous, narrow-campanulate, with triangular carinate teeth: corolla white, hardly equalling the calyx-teeth.

Known only in flowering specimens obtained at Port Clarence, Bering Strait, 28 June, 1890, by a former pupil of mine, Mr. W. G. Hay.

ANDROSACE GORMANI. Biennial or perennial, not multicipitous, but with the habit of *A. septentrionalis*, though smaller and more slender; leaves ¼ to ¾ inch long, plane, subsucculent, from ovate to ovate-spatulate in the smaller (young?) plants to spatulate-lanceolate in the larger, entire, or the upper portion with a few prominent teeth, glabrous beneath, the upper face almost hispidulous with minute branching hairs: scapes purplish and scaberulous, 2 to 4 inches high, bearing 6 to 12 or more small flowers in a dense umbel: calyx obpyramidal, 5-angled, the carinate teeth scarcely half the length of the tube: corolla white, barely surpassing the calyx.

An Alaskan species, obtained at Fort Selkirk in the Yukon Valley, "on dry gravelly soil and old river benches," by Mr. M. W. Gorman, 24 May, 1899. Distributed under n. 981.

ANDROSACE PINETORUM. Perennial, not multicipitous, the often solitary scape from the midst of a single rosula of apparently depressed leaves, these oblanceolate, but tapering to a linear basal and petiolar part, the whole ½ inch long or more, the laminar part commonly with 2 or 3 pairs of serrate teeth, the upper face scaberulous, the lower hardly so, but, with the scape, purplish: central scape 4 to 6 inches high, often accompanied by one or more lateral ones which are shorter: pedicels less than ½ inch long, the umbel therefore contracted; both pedicels and calyx obscurely scaberulous: calyx-teeth subulate, more than half as long as

the tube: corolla white or pinkish with yellow center, surpassing the calyx and about 2 lines broad, the lobes obovate, obtuse.

In pine woods of Graham's Park, Rio de los Pinos, at 7,800 feet, southern Colorado, 12 May, 1899, C. F. Baker. The species bears more resemblance to real Old World *A. septentrionalis* (not believed by me to exist in this country), than do any of the plants of the far West and North that have been referred to it. Its habitat, in its native southern latitude, is not even subalpine. The short pedicels and contracted umbel appertain, it may be, to young and merely flowering plants. Other specimens, obtained by Mr. Baker from along irrigating ditches, and being in fruit, exhibit long pedicels and a loose diffuse umbel; and the plants are larger every way than in those from the pine woods above; a natural result of generous nourishing.

Androsace asprella. Perhaps annual or biennial, the root very slender, sustaining a small rosula and several low slender scapes with lax few-flowered umbels, the pedicels nearly as long as the scapes: leaves $\frac{1}{2}$ inch long, spatulate to oblong-linear, entire, glabrous beneath, nearly so above, the margins sparsely ciliolate; scapes, bracts, pedicels, and even the calyx rough with short hairs, these seldom simple, usually divaricately forked, much coarser than the pubescence of allied species: calyx broadly obpyramidal, the broadly or triangularly subulate teeth almost as long as the tube.

Rogue River Valley, Oregon, 16 July, 1887, Thomas Howell; distributed for *A. septentrionalis*, and with the habit of *A. diffusa*, but exhibiting the best of specific characters.

Physalis polyphylla. Perennial, the erect freely branching and very leafy stems 6 to 10 inches high, from apparently horizontal roots; the branches and main stem

angular and scabrous-puberulent: leaves mostly 1 to 1½ inches long, the lower lanceolate and notably feather-veined with white but rather fine veins; the very numerous rameal ones mostly linear, or nearly so, and 1-nerved, all quite entire and nearly glabrous except along the margin and veins, here strigulose: peduncles about ½ inch long, ascending in flower, deflexed in fruit: corolla rather small, greenish-yellow, with dark-green spots: fruiting calyx broadly and acutely ovate, thinnish, reticulate, glabrous except as to the rather shortly and broadly triangular-lanceolate teeth, these whitish-puberulent.

Collected at Piedra, southern Colorado, 12 July, 1899, by C. F. Baker; the specimens mostly not well past the early flowering. The species is related to what Mr. Rydberg has identified, though to my mind not satisfactorily, with *P. Virginiana;* from which it differs greatly in its very many small entire leaves, and their conspicuous venation. The form of the mature calyx is also in lively contrast with that of *P. Virginiana*, Rydb.

CASTILLEIA LINEATA. Tufted stems rigid and brittle, but not suffrutescent, about a foot high from a perennial root, narrowly and not densely spicate for about one-third the length; herbage hoary-tomentose: leaves ascending, linear, 2 inches long, entire, or in more robust plants with one or more pairs of linear segments, all strongly 3-nerved and channeled and appearing striate: bracts similar to the leaves, more commonly palmately cleft to the middle into 3 linear lobes: corollas greenish and inconspicuous, little exceeding the calyx and bracts.

Moist slopes near Pagosa Springs, southern Colorado, 18 July, 1899, C. F. Baker. Very distinct from all other Castilleias of the Rocky Mountain region, and not very closely allied to the tomentose species of even Mexico and California.

VERBENA RUDIS. Allied to *V. bracteosa*, but the numerous assurgent or nearly prostrate stems from the branching crown of a hard thick woody perennial root· stems less distinctly angular, and pubescence more softly hirsute: leaves cuneate-obovate, variously incised or subpinnatifid, their sparse pubescence closely appressed: spikes loose and bracts only half as long as in *V. bracteosa.*

Arboles, southern Colorado, 18 June, 1899, C. F. Baker. Said to be a common weed of roadsides and cultivated lands. Its remarkably thick hard woody perennial roots alone would completely separate it from *V. bracteosa.*

VERBENA CONFINIS. Also allied to *V. bracteosa*, and the root annual, but rather tall much branched stems apparently erect or ascending; herbage greener, but under a lens appearing sparsely hirsute: leaves distinctly 3-lobed, the two lateral lobes short and divaricate, the middle one many times larger and cuneate, incisely toothed or cleft: spikes elongated and very lax, many of its bracts and flowers in opposite pairs, the bracts smaller and narrower than in *V. bracteosa.*

Organ Mountains, New Mexico, 30 Aug., 1897, E. O. Wooten (his n. 409 of my set). I know so much, by field experience, about verbena hybrids, and even of such as have *V. bracteosa* for one parent, that this plant would have been under suspicion but for the fact that, while Mr. Wooten called it *V. bracteosa*, his collection contained neither that species nor any other which, with *V. bracteosa*, could have generated this. I am therefore convinced that it is a proper species.

CHRYSOTHAMNUS BAKERI. Low, compact, the crowded erect flowering branches only 5 to 7 inches high, from a much branched woody caudex and thick hard-woody root: bark of flowering branches glabrous and white; leaves about an inch long, narrowly linear, deep-green and glabrous, but

conspicuously punctate: corymbose cyme dense, the heads rather large for the plant, 5 to 7-flowered; involucre narrowly turbinate, its oblong-linear bracts in about 3 series and forming vertical ranks, glabrous, with green-herbaceous thick tips and a very narrow thin-scarious or hyaline margin: ovaries glabrous.

Near Chama, New Mexico, 5 Sept., 1899, C. F. Baker. Allied to *C. Greenei*, but with very different leaves and involucre.

CHRYSOPSIS BAKERI. Densely tufted stems slender, about a foot high, dark-red or purplish, equably though somewhat sparsely leafy and the leaves ascending, frequently monocephalous, otherwise with a few leafy and monocephalous branches toward the summit: leaves 1 inch long, cuneately oblanceolate, acute, entire, strigulose-pubescent on both faces and with minute sessile resinous atoms underneath the pubescene: heads broad and short for the genus, subcampanulate; involucral bracts mostly dark-reddish like the stem, more villous than the stem, in several series but not very regularly imbricated: rays of a deep golden-yellow approaching orange: achenes silky; outer pappus obvious, whiter than the inner but setaceous rather than paleaceous, rather scanty.

Common, growing in large bunches on ledges and in stony dry beds of streams, at about 9,000 feet in the mountains of southern Colorado toward Pagosa Peak, C. F. Baker, 23 Aug., 1899. A remarkably slender species for this genus, and well marked in characters of involucre, and the more than ordinarily deep-colored flowers.

CHRYSOPSIS HIRSUTISSIMA. Stems only 4 to 8 inches high, very erect and densely leafy, from a ligneous and branched caudex crowning a strong deep-seated woody root: whole plant of a silvery whiteness, the stem clothed with a long and rather stiffly hirsute or almost hispid white-hairiness,

the leaves as white with a dense strigose pubescence, their outline oblanceolate, all tapering to short slender petioles, heads solitary in the smaller plants, fastigiate-corymbose in the larger: involucre very regularly imbricated, broadly turbinate: rays rather light-yellow: achenes densely appressed-silky: outer pappus obvious, indistinctly paleaceous.

On dry rocky declivities leading to the mesas, at Arboles, southern Colorado, C. F. Baker, 5 June, 1899. Related to *C. hispida*, yet very distinct, as the strong ligneous undergrowth and abundant white indument attest.

✓ CHRYSOPSIS PEDUNCULATA. Stems numerous from a subligneous branching caudex, short and depressed, forming large mats: oblanceolate leaves almost silvery-canescent with a fine appressed somewhat strigulose pubescence: heads rather large for the genus, solitary or several on long almost naked peduncles, these 2 inches long or more, often quite as long as the densely leafy stem itself: short outer bracts of the broad involucre subulate, the innermost oblong-linear, all equally canescent with the foliage, often purplish on the margin: rays showy, golden-yellow: achenes densely silky; outer pappus conspicuous, of unequal narrow and almost setiform paleæ.

Dry hillsides about Pagosa Springs, southern Colorado, C. F. Baker, 20 July, 1899. A beautiful species, altogether unique among its allies by its short decumbent or assurgent stems, and few long-peduncled heads.

✓ GRINDELIA SUBINCISA. Stems apparently several and decumbent, a foot high or less, freely and rather loosely branched from toward the base, the branches slender, sparingly leafy, and mostly monocephalous: lowest leaves oblanceolate, or ligulate-oblanceolate, commonly 3 to 5 inches long, rather thin, glabrous or the upper surface obscurely scabrous, the margin variously but usually remotely incise-serrate or even subpinnatifid, those of the branches oblong-

lanceolate and sessile, incisely serrate: involucres hemispherical or subglobose, $\frac{1}{2}$ to $\frac{3}{4}$ inch broad, the numerous and strongly imbricated bracts with long slender more or less squarrose green tips: rays numerous, long and showy, of a golden-yellow: achenes all turgid and turgidly ribbed, those of the ray trigonous, of the disk somewhat compressed and 2-edged: bristles of the pappus 3 in the ray, 2 in the disk, all short, slender for the genus, glabrous.

Chama, New Mexico, 5 Sept., 1899, C. F. Baker.

✓ ERIGERON ACCEDENS. Habit of *E. divergens*, rather larger, commonly more than a foot high, cinereously hirsutulous: basal leaves of broadly oblanceolate outline, abruptly and cuspidately acutish, mostly with 2 or 3 pairs of coarse teeth or shallow lobes, but some with only 1 or 2 such teeth, a few quite entire, all tapering to a slender petiole twice the length of the blade; the proper cauline and rameal ones spatulate-linear, entire, sessile: heads subcorymbose, the peduncles well elongated: bracts of the low-hemispherical involucre hirsute, subequal in several series, linear, acuminate: rays 125 or more, very narrow, pale violet: pappus of rather few and very delicate bristles and a number of subulate minute squamellæ.

Collected at Clifton, Arizona, April, 1899, by Dr. A. Davidson. Evidently a more showy species than its near ally, *E. divergens*, from which its pinnately toothed and long-petiolate foliage as well as larger heads render it easily distinguishable.

ERIGERON PURPURATUS. Related to *E. compositus*, similarly cæspitose though more loosely, and the monocephalous peduncles scapiform, but leaves narrowly oblanceolate and entire, except a few of the earliest which are obovate-dilated at summit and 3-toothed or 3-lobed, all sparsely pilose, the largest $1\frac{1}{2}$ inches long, including the long narrow petiolar basal part: peduncles 2 or 3 inches high,

with a few leafy bracts at base, somewhat villous-hirsute at the gradually thickened summit: bracts of the involucre linear, acuminate, rather densely hirsute below, the acuminate tips naked and of a dark purple: rays numerous and slender, decidedly shorter than in *E. compositus*, pinkish or flesh-color: pappus rather copious and firm, of a distinct purplish red.

Sandy river bank at Fort Selkirk in the Yukon Valley, 28 June, 1899, M. W. Gorman. A most distinct new *Erigeron*, remarkable for the vivid color of the pappus. No more interesting plant has come to us from the far Northwest in recent years. It is therefore unfortunate that but a single specimen was collected; though that is a very good one.

ERIGERON GORMANI. Near *E. compositus*, the herbage of a much more vivid green, minutely and densely glandular and viscid, scarcely pubescent, but with a scattered and almost hispid ciliation on the pitioles of the short and almost erect leaves; earliest foliage merely 3-cleft or lobed and the lobes little divergent, oblong; later leaves with the lateral lobes, and sometimes the terminal one, 3-lobed: numerous scapes about 4 inches high, far surpassing the leaves, linear-bracted below: involucres only sparsely hirsute: rays very numerous, rather slender, flesh-color.

Dry sandy soil at Fort Selkirk on the Yukon River, 28 June, 1899, M. W. Gorman.

EUCEPHALUS FORMOSUS. Habit of *E. glaucus* but smaller and less branching, equally pale and glaucous, the leaves thinner, not reticulate, pungently mucronate, the margin scabrous-denticulate under a lens; branches of the corymbose panicle pubescent: involucres broad and subcampanulate, their bracts in 4 series, very broad and obtuse, cuspidately or mucronately pointed, minutely woolly-ciliolate, deeply purple-tinged: rays very showy, about

twice as numerous as in *E. glaucus*, broader and of a deep blue.

Shady slopes at 9,500 feet in the mountains towards Pagosa Peak, southern Colorado, 23 Aug., 1899, C. F. Baker. Much more showy than any forms of its ally, *E. glaucus.*

TOWNSENDIA BAKERI. Subacaulescent and depressed perennial: somewhat rosulate leaves oblanceolate, spatulately tapering to a long and narrow petiole, the whole 1 to nearly 2 inches long, the petiolar part, and also the naked and scapiform peduncles, canescent with a villous pubescence, the leaf proper glabrate, of membranaceous texture: peduncles barely an inch long; heads rather large, the involucre hemispherical, the oblong or elliptic-oblong acute bracts imbricated in about 3 series, deep green, but with a narrow and closely ciliolate scarious margin: rays white, but externally green, or greenish with a purple tinge: disk-corollas of a vivid green: pappus of the disk plurisetose, of the ray very short, not longer than the breadth of the achene, but setulose rather than squamellate.

On dry hills among pines, at Los Pinos, Colorado, 16 May, 1899, C. F. Baker. This appears to be a short-lived perennial, most of the specimens being small, with a tuft of leaves and peduncles from the simple crown of a perpendicular root. These I infer to be young plants of one or two years from the seed. Others are much larger and truly multicipitous, the short branches of a former season having survived and put forth each its tuft of leaves and flowers. These must be older specimens, and have the habit of other multicipitous species.

MACHÆRANTHERA PRUINOSA. Root not known, the stout widely and subcorymbosely panicled stem 3 feet high or more, purple, but whitened with a pruinose pubescence of stiff, many-jointed hairs, but in no degree viscid or glandular: leaves (only the upper cauline known) oblong-lance-

olate to oblong-linear, the largest 3 inches long or more, all thinnish, deep-green, sparingly pubescent only along the 3 veins and their ramifications, mucronately pointed at the obtuse apex, the margins evenly and rather coarsely dentate: involucres at the ends of all the branches, very large ($\frac{3}{4}$ inch broad), campanulate, the excessively numerous bracts closely imbricated by their white basal part, the long linear-subulate green and pruinose tips widely spreading: rays large and numerous, deep-purple: achenes narrowly oblanceolate, closely striate, very glabrous; pappus in a single series, but unequal.

Collected in the Sierra Madre, Chihuahua, Mexico, in Soldiers' Cañon, 11 Oct., 1899, by Messrs. Townsend and Barber. A very beautiful species, related to *M. Bigelovii*, but very distinct as to character of pubescence, indentation of leaves, etc.

Alisma brevipes. Perennial, the corm-like subterranean base of the stem fibrous-coated by the remains of last year's petioles; scape and panicle 10 to 18 inches high: leaves 2 inches long more or less, of uncommonly firm texture, elliptic-lanceolate, or the very lowest lanceolate with subcordate base, all tapering acutely to a short and blunt somewhat callous apex, 5-nerved, the margin also raised and nerve-like but thin-edged and more or less distinctly erose-denticulate under a strong lens; petioles very short, scarcely as long as the blades: naked part of the scape little if at all surpassing the leaves, the panicle pyramidal, ample but not diffuse: deltoid-ovate sepals strongly 7-nerved: petals obovate, exceeding the sepals, forming a corolla of $\frac{1}{4}$ inch in breadth or more.

In low wet places at Piedra, southern Colorado, 12 July, 1899, C. F. Baker. Quite distinct from all other *Alisma* forms by its short petioles and peduncles, firm white-nerved and white-margined foliage, etc. The specimens are barely well in flower, no fruit having arrived at maturity.

Vol. IV. Part 23.

PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Professor of Botany in the Catholic University of America,

Washington, D. C.

December, 1900.

CONTENTS:

	PAGE
A Fascicle of New Arnicas, - - - - -	159
Some Rudbeckia Segregates (By T. V. Moore), - -	174
A Decade of New Gentianaceæ, - - - -	180
Studies in the Cruciferæ—III, - - - -	187
1. Certain Species of Arabis, - - - - -	187
2. Miscellaneous New Species, - - - -	198
3. Type of the Genus Draba, - - - - -	203
4. A Proposed New Genus Abdra, - - - -	205
Neglected Generic Types—II, - - - - -	207
Some Rocky Mountain Asters, - - - -	212
Corrections in Nomenclature—III, - - - -	224

Price, Fifty Cents.

Payot, Upham & Co., *San Francisco*: William Wesley & Son, *London.*

A Fascicle of New Arnicas.

**Allies of* A. Chamissonis; *stems tall, with few pairs of leaves, the radical ones wanting or inconspicuous.*

A. crocea. Stout, 2 feet high, with 3 or 4 pairs of cauline leaves, and 1 to 3 long-peduncled large heads: lowest leaves oblong-lanceolate, short-petiolate, the cauline ovate-lanceolate, sessile by a broad base, sharply acuminate, obscurely denticulate, rather firm, slightly hoary-tomentulose on both faces; the stem and peduncles more hirsutulous, most of the hairs gland-tipped: heads ¾ inch high, 1 inch broad, almost hemispherical; bracts of involucre biserial, narrowly lanceolate, acuminate, hirsutulous, not glandular: large orange rays 7-nerved, obtusely and not deeply 3-toothed; disk-corollas with short villous tube and larger broad-funnelform glabrous throat, the teeth with or without traces of bristles: achenes black, softly and rather sparsely hirsute; pappus short, fuscous, subplumose.

This is well represented in n. 19,645 of the Canadian Geol. Survey; the specimens collected by Mr. W. Spreadborough, at an altitude of about 5,800 feet on Canoe River, headwaters of the Columbia River, in British Columbia, 11 Aug. 1898. By its large heads, with showy orange-colored rays, one would like to identify it with the very ill-defined *A. mollis*, Hook.; but the pubescence and the foliage are very far from answering to the little which Hooker had to say about them.

A. Columbiana. Dimensions of the last, but the heads more numerous and rather smaller; stem more leafy, all

Pittonia, Vol. IV. Pages 159–226. Issued 8 Dec., 1900.

the leaves lanceolate, 3 to 5 inches long, exceeding the internodes, more or less tapering to the base and, except the uppermost and somewhat spatulate pairs, short-petiolate; pubescence fine but not tomentulose, the margins saliently dentate: no hairs even of stem or peduncles gland-tipped: involucres campanulate, their biserial bracts cuneate-oblanceolate, nearly acutish: rays light-yellow, broader and shorter than in the last, 8-nerved: disk-corollas slender, the long tube villous, the narrow throat glabrous, the elongated teeth slightly bristly: achenes setulose; pappus dull-white, merely barbellulate.

Also British Columbian, being n. 19,646 of the Canadian Survey, collected on Maclennan River, another tributary of the Columbia, by Mr. Spreadborough, 27 July, 1898. It can not be referred to *A. Chamissonis*, since it lacks the distinctly obovate leaf-cut, the broad, short disk-corollas, and the tawny subplumose pappus of that species. The pubescence is also very different.

A. Macounii. Allied to *A. amplexicaulis*, Nutt., but taller, often 2 or 3 feet high; leaves spatulate-lanceolate and lanceolate, sessile and amplexicaul, often 4 inches long, less than an inch in width, lightly serrate rather than dentate, the margins scaberulous, the upper face with scattered short hairs not pustulate; inflorescence rather ample, corymbose-panicled, the peduncles clothed with short hairs tipped each with a large gland: campanulate involucre not in the least glandular, its short lanceolate bracts sparsely hispidulous-hairy: rays about 6-nerved, deeply notched (2-toothed): disk-corollas with short hispidulous tube and much longer funnelform glabrous throat: achenes slender, strongly-ribbed, sparsely short-bristly and with a similar distribution of sessile glands; pappus short, rigid, loosely barbellate, fuscous.

Near Comax, Vancouver Island, 1 July, 1893, John Macoun. Distributed from the Canadian Survey Herbarium as *A. Chamissonis*, but the plant is more allied to *A. amplexicaulis.*

A. OVATA. A foot high or more, stoutish, sparingly leafy, the leaves in only 2 or 3 pairs and not more than half the length of the internodes, rather narrowly ovate, or lance-ovate, acutish, callous-denticulate, the lowest on short winged petioles, all finely pubescent on both faces, especially near and on the margin: heads about 3, subtended by a pair of ovate-lanceolate very acute bracts, the peduncles naked: involucres campanulate, their bracts lanceolate, acuminate, glandular-pubescent: rays rather narrow, mostly 2-dentate; disk-corollas with very short hirsutulous tube and twice longer narrow-funnelform throat including the elongated-triangular naked teeth.

Waksatch Mountains, Utah, at 11,000 feet, 31 July, 1879, Marcus Jones (n. 1,128 in my set); distributed for *A. mollis.*

A. MACILENTA. About 2 feet high, with 5 or 6 pairs of rather ample thin leaves, the lower pairs elliptic-lanceolate, strongly connate-sheathing, the middle pairs lanceolate and oblong-lanceolate, sessile by a short spatulate base, the uppermost sessile by a broad half-clasping base, all obscurely dentate or entire, green and glabrous to the unaided eye, a lens disclosing a sparse indument of short bristly appressed hairs on the upper face, and of more slender and somewhat woolly ones beneath; stem and petiolar sheaths hirsutulous with white more or less retrorse hairs: heads about 3, on short slender peduncles; involucre campanulate, of 2 series of very thin oblong and oblong-lanceolate obtuse bracts somewhat appressed-villous with fine but obviously jointed hairs: rays thin, broad, obtuse, shallowly 3-dentate: disk-

corollas with short villous tube and much longer funnelform throat, the short deltoid teeth sparingly bristly: achenes setulose; pappus somewhat tawny, scarcely even barbellulate.

Collected on the Shetland Ranch, mountains of northern Colorado, 12 July, 1896, by C. F. Baker. The plant was formerly referred by me to my *A. subplumosa*, with much hesitancy. But its pappus is at the opposite extreme from subplumose, and the strong leafiness, with thin texture, very thin and obtuse involucre bracts, all are characters demanding its separation.

A. MULTIFLORA. Several-stemmed from the rootstock, not slender, a foot high, the smallish heads 3 to 12: lowest leaves from elliptical to ovate-lanceolate, 1 to 2 inches long, on flattened petioles twice as long, the broadest acute at base, the longer subcordate, all with a few salient serrate teeth, scaberulous above, glabrous beneath, the margin scabrous-ciliate; the lowest cauline oval, abruptly tapering to a broadly-winged and basally much dilated petiole, the uppermost pair ovate-lanceolate, sessile by a broad base: involucres about ½ inch high, broadly turbinate, their bracts biserial and the outer series longer, glandular-puberulent: rays short and broad, broadly and not deeply notched at apex: achenes glandular-scaberulous; pappus white, barbellate.

Woods about Lake Pend d'Oreille, Idaho, J. B. Leiberg, June, 1891, n. 234. Also apparently the same, in a reduced form, from Mt. Steele of the Olympic Range, Washington, C. V. Piper, Aug. 1895, n. 2203. And again; specimens quite like the originals by Leiberg are in the U. S. Herbarium, collected near Columbia Falls, Montana, 14 June, 1894, by R. S. Williams, these bearing the label n. 1049. The species is notable on account of its profusion of smallish heads.

A. RIVULARIS. A foot or two in height, rather slender, with about 3 pairs of leaves and 3 heads: leaves thin, ascending, the lowest nearly 5 inches long including the petiole, oblanceolate, obtuse, denticulate; the middle pair nearly as long, but narrower, spatulately tapering but sessile; the uppermost much smaller, ovate-lanceolate, entire, sessile; all sparsely pubescent on both faces and with scattered minute sessile glands above: upper part of stem, as also the peduncles and involucres, sparsely hirsute, most of the hairs minutely gland-tipped: all the peduncles slender, the lateral two much longer than the terminal one: involucres campanulate, their lanceolate acuminate bracts mostly uniserial: rays 10 to 12, deep yellow, not large, as often bidentate as tridentate: disk-corollas short, funnelform, pubescent: achenes sparsely hirtellous, and with scattered sessile glands near the summit; pappus fuscous, subplumose.

Subalpine stream-banks of the Powder River Mountains, at 5,000 feet altitude, eastern Oregon, W. C. Cusick, 1897 (n. 1795 in my set). Related to *A. subplumosa* of Colorado and Wyoming, yet thoroughly distinct, and as far removed as that from any specific connection with *A. Chamissonis*, which name is printed on Mr. Cusick's labels.

A. BETONICÆFOLIA. Dwarf, the many slender ascending usually monocephalous stems 3 to 6 inches high, with 2 or 3 rather remote pairs of small sessile leaves: lowest and short-petiolate leaves oval to oval-lanceolate, obtusish, somewhat serrate-toothed, seldom an inch long; the cauline less elongated, more obtuse, crenate or serrate or subentire, ½ to 1 inch long, all glabrous beneath, or on both faces, or the upper face with some scattered short hairs; peduncle on base of involucre puberulent: involucre less than ½ inch high, turbinate, its broad bracts nearly uniserial, acute

or acuminate, pubescent: rays 7-nerved, truncate and 3-dentate: disk-corollas somewhat granular-puberulent, and with some fine bristly hairs on the teeth outside: achenes glabrous except a few scattered hairs at summit; pappus fine, white, barbellulate.

At 6,000 to 7,000 feet on slopes of Mt. Steele of the Olympic Mountains, Washington, Aug., 1895, C. V. Piper, n. 2002. Also at timber line on Mt. Hood, Oregon, Dr. C. H. Merriam, 1896, in U. S. Herbarium. Somewhat related to the Alaskan *A. latifolia*, though of different habit, and with excellent characters over and above the reduced size of the plant.

A. LONCHOPHYLLA. About a foot high, with 3 or 4 pairs of small lanceolate leaves much shorter than the internodes, and about 3 short-peduncled heads: radical leaves elliptic-lanceolate, slender-petiolate, strongly 3-nerved; cauline lanceolate, sessile, denticulate, with only the midnerve prominent, all, as well as the stem, sparingly hirsute and somewhat glandular: small involucres turbinate, their bracts linear-lanceolate, acuminate, pubescent and glandular: rays light-yellow, 5 to 7-nerved, 3-dentate disk-corollas with short hirsute tube and a longer subcylindric glabrous throat, the teeth somewhat bristly-hairy: achenes hirsutulous; pappuse fine, white, barbellulate.

On the Athabasca River, 25 June, 1898, W. Spreadborough; n. 19,647 of Canadian Geol. Survey, communicated by Mr. Macoun.

A. TEUCRIIFOLIA. Stems apparently tufted, 6 to 10 inches high, its leaves in about 3 pairs, the solitary head long-peduncled: root-leaves from ovate and 1 inch long to elliptic-lanceolate and 2½ inches, none as long as their slender petioles, evenly serrate-toothed; the cauline all

sessile, oval to ovate-lanceolate, 1 to 2 inches long, remotely and slightly serrate, both faces sparsely pubescent and more densely glandular, the minute glands only subsessile: peduncle finely villous and glandular: bracts of the involucre broadly lanceolate, acuminate, glandular-viscid and glandular-ciliolate: rays deep-yellow, 9-nerved: disk-corollas very narrow, with small distinction of tube and throat, only the lower portion and the teeth villous: achenes almost villous at summit, otherwise glabrous; pappus fine, white barbellulate.

On grassy slopes of the mountains between St. Joseph's River and the Clearwater, Idaho, 10 July, 1895, J. B. Leiberg, n. 1229 of his collections, as represented in the U. S. Herbarium. In its foliage, both as to form, pubescence, and general bearing, this small *Arnica* recalls *Teucrium Canadense*, or *Stachys aspera*.

A. SCABERRIMA. Stout stems 2 feet high, with only 2 pairs of leaves over and above the small and bract-like ones subtending the several long naked stout peduncles: lowest leaves 6 inches long, spatulate-oblanceolate, rather closely dentate, the upper pair as long and as saliently dentate but of oblong-lanceolate outline and sessile, both faces of all strongly scabrous: stem and peduncles rough with short stiff, mostly gland-tipped, hairs: involucres campanulate, their bracts biserial, the outer somewhat oblanceolate, acute, hirsutulous: rays deep-yellow, not large in proportion to the heads; disk-corollas slender, only the short tube hirsute: achenes hirsute and with some sessile glands; pappus fuscous, subplumose.

One of the largest species, and the most robust of all; apparently peculiar to subalpine districts in the mountains of southern California. The specimens seen by me are in the U. S. Herbarium; one by C. A. Purpus, from Little

Kern River, at an altitude of 9,000 to 10,000 feet, the label bearing the collector's number 5,260. The other is by J. G. Lemmon, the locality not given, but only the year 1875; but I recall that in that year Mr. Lemmon collected chiefly in the mountains of southern California.

A. ARNOGLOSSA. Stems a foot high or more, somewhat tortuous, striate, leafy to the middle, a pair of large bracts subtending the 1 to 3 short-peduncled heads: lowest leaves ovate-lanceolate, acute, 2 or 3 inches long, tapering to a broad or even distinctly winged petiole, the middle cauline as long, more lanceolate and spatulate, all remotely serrate-toothed, or dentate, or denticulate, or subentire, of very firm texture, deep-green above, pale beneath, sparsely scabrous on both faces, and with 5 strong parallel nerves very prominent beneath: peduncles and involucres glandular-puberulent, devoid of hairiness: rays 8-nerved, sharply and rather deeply 3-dentate: disk-corollas narrow, pubescent except the teeth; achenes hirsute; pappus white, rigid, serrulate.

Black Hills of South Dakota, near Fort Meade, W. H. Forwood, 1887. Species perhaps somewhat local; certainly of very pronounced character; the leaves so strongly parallel-nerved as to recall those of certain species of *Plantago*. Type specimens in U. S. Herbarium.

A. TOMENTELLA. Two feet high, stoutish, pale and cinereous, the foliage finely and closely tomentulose on both faces, the peduncles glandular-puberulent: leaves oval to elliptical and elliptic-lanceolate, the largest 3 inches long, on petioles still longer, even the lowest cauline pair on elongated slender petioles, all remotely denticulate, the bract-like floral pairs lanceolate, sessile: heads about 5, large, on long naked peduncles: bracts of involucre biserial,

broadly oblanceolate, acute, glandular-pubescent, the margins white-woolly, the outer series concave, partly enfolding the ray-achenes: rays ample, yellow, not distinctly nerved: disk-corollas narrow, hirsute throughout, the tube and the teeth most so; achenes sparsely hirsute; pappus dull-white, subplumose.

Open woods of the middle Tule River in southeastern California, at an altitude of about 5,500 feet, C. A. Purpus, 1897; the specimens in the U. S. Herbarium. The species is particularly remarkable on account of a certain approach which it makes to the genus *Whitneya* in the character of its pubescence, firm nerveless rays, and concave involucral bracts.

A. Lessingii. *A. alpina*, less., not Olin. *A. angustifolia* var. *Lessingii*, Torr & Gray, Fl. ii, 449. Larger plants a foot high or more, leafy to the middle, the leaves in about 3 pairs, smaller plants 6 inches, more or less, the pairs of leaves all crowded at base of stem and the long peduncle scapiform: stem more or less villous-hirsute with reddish hairs; leaves from almost glabrous to scabrous-pubescent, the margins more strongly and softly pubescent, the largest 3 inches long, oblong-lanceolate, some spatulately tapering to the broad short petiole, all rather remotely serrate-toothed and 3-nerved: head solitary, large, nodding: bracts of the involucre biserial, herbaceous, lanceolate, acute, pubescent, often purplish: rays 8 to 12, more than an inch long, 8-nerved, deeply notched or 3-dentate, light-yellow: disk-corollas with short villous tube and much longer, broadly subcylindric glabrous tube, the teeth naked, erect: achenes strongly striate-glabrous or scabrellous; pappus, dull-white or tawny, barbellate.

A common and beautiful species of Alaskan shores and islands.

A. ovalifolia. Stems several, a foot high or more, simple, leafy from the middle, the solitary head long-peduncled: leaves in 2 or 3 pairs, oblong-ovate and oval, 1½ to 2½ inches long, abruptly cuneate at base and sessile, sharply serrate or dentate, sparsely strigulose and densely though minutely glandular-punctate on both faces: upper part of peduncle and base of involucre villous-hirsute; bracts of involucre uniserial, broadly linear-lanceolate, acuminate, sparsely hirsute and viscidly glandular: achenes sparsely hirtellous, the hairs all gland-tipped; pappus white, barbellulate.

Big Horn Mountains, Wyoming, at 9,000 to 10,000 feet, 17 July, 1890, Mr. Blankinship. Resembles a small and simple-stemmed *A. latifolia*, but the foliage is of thicker and firmer texture, and the glandular indument of leaves and achenes are very characteristic.

* * *Allies of* A. foliosa; *leaves numerous, rather long and narrow; herbage more or less hoary-tomentose.*

A. tomentosa. J. M. Macoun in Herb. Dwarf, the densely tufted stems 2 to 4 inches high, mostly monocephalous, rarely with two or more heads: radical leaves oblanceolate, obtuse, 3-nerved, 1 to 1½ inches long. the single cauline pair inserted near the base of the stem, lanceolate, sessile, entire, somewhat arachnoid-tomentose and obscurely glandular: bracts subtending the short peduncled heads small, lanceolate, sessile: upper part of stem, the peduncle and involucre white with a dense villous tomentum: bracts of the involucre uniserial, lanceolate, obtusish: rays bright-yellow, 7-nerved, sparsely villous externally: disk-corollas with villous tube and glabrous almost cylindric throat; achenes densely silky-villous; pappus white, barbellate.

British American Rocky Mountains, near the Athabasca River, 30 June, 1898, collected by Mr. W. Spreadborough, and communicated under the above appropriate name, by Mr. Macoun. It is not easy to suggest any near affinity for a species so strongly marked, especially in the peculiar indument of its achenes.

A. INCANA. *A. foliosa*, var. *incana*, Gray, in part only. Much stouter than the last, with a considerable tuft of long erect basal leaves, the three more distinctly cauline pairs much reduced and all shorter than the internodes, the whole herbage whitish with a dense floccose tomentum: leaves all lanceolate, only the very lowest denticulate, the rest entire: heads twice as large as in the last, the numerous lanceolate biserial bracts less woolly than other parts: rays loosely villous externally: disk-corollas with long hirsute tube and narrow glabrous throat, the teeth sometimes bristly at tip: achenes short-setulose and minutely glandular; pappus subfuscous, subplumose.

Dr. Gray, in defining this as a variety of *A. foliosa* made mention of only one of its several good distinguishing characteristics. Quite as remarkable as its pubescence, is the peculiarity of its large tuft of enduring basal leaves and the few and reduced cauline ones, these features investing the plant with an aspect most unlike that of *A. foliosa*; and again, this stout stem and large bunch of leaves are supported by a strong tuft of long coarse roots, nothing like which is seen in *A. foliosa*, where the slight and slightly leafy stems seem to require no support other than that of the roots scattered along the length of the rhizome.

The best type of *A. incana* occurs in the high mountains of middle California, about Lake Tahoe. Other plants, intermediate between the two, occur further northward in same range, and were referred by Gray to this variety. No

doubt among such will ultimately be found the types of two or three other species, when they become better known. It appears that some plants quite equivalent to my *A. denudata* var. *canescens* were also included in Gray's var. *incana*.

A. Bernardina. Nearly allied to the last, and with similarly bunched coarse, even fleshy-fibrous roots, tufted basal leaves, etc., but only cinereous with a fine tomentose pubescence, this here and there overspread with some long arachnoid hairs, especially the leaves beneath; foliage larger, more elliptic-lanceolate, and more conspicuously denticulate or dentate: heads still larger, nearly ¾ inch high and an inch broad; involucral bracts oblong, obtuse, much shorter than the disk: rays relatively larger than in either of the last two, somewhat villous on the outside, 8-nerved, 3-toothed: disk-corollas with long villous tube and much shorter broad and almost campanulate glabrous throat: achenes only sparsely short-setulose, not glandular; pappus long, dull-whitish, barbellate.

This local subspecies, several times distributed by Mr. Parish, from Bear Valley of the San Bernardino Mountains, southern California, under the name of *A. foliosa*, is marked by large and long acute leaves along with which go the most short and obtuse of involucral bracts seen in this genus.

A. attenuata. A foot high, sparingly somewhat villous-pubescent, most so upon the stem and the margins and veins of the narrow leaves, the latter in mostly 3 or 4 pairs, narrowly lanceolate-acuminate and linear-acuminate, entire, 3-nerved; the two upper pairs much reduced, the longest of the lower 2 or 3 inches long: heads 3 to 5, the lateral ones later than the terminal and their peduncles bibracteate: bracts of the campanulate involucre narrow-lanceolate,

densely villous below the middle: rays elongated, deep-yellow, 9-nerved, 3-toothed, the teeth short: disk-corollas short, the villous tube and glabrous short-cylindric throat about equal: achenes canescently villous; pappus white, barbellulate.

An Alaskan species, collected on Lewis River, 13 June, 1899, by Mr. M. W. Gorman.

* * * *Allies of* A. CORDIFOLIA; *the radical leaves broad, cordate or subcordate; the cauline though in few pairs usually as broad; stems low.*

A. DIVERSIFOLIA. Stems a foot high, with 2 or 3 pairs of leaves and 1 to 3 heads: lowest leaves round-ovate or subreniform-ovate, 2 inches in length and breadth, truncate or subcordate, on petioles of 1 or 2 inches; middle pair of ovate or lance-ovate outline, short-petioled and the petioles winged; the floral pair reduced, triangular; all saliently and often coarsely serrate-toothed, glabrous beneath, the upper face sparingly pubescent and glandular, the stem and peduncles glandular-puberulent or pubescent: involucres only glandular-pubescent, their thin bracts lanceolate, acuminate: rays few, light-yellow, 3-dentate: disk-corollas funnelform, glabrous: achenes hirtellous on the angles; pappus dull-white, barbellulate.

On northward slopes of the highest Powder River Mountains, eastern Oregon, at 8,000 to 9,000 feet, W. C. Cusick, 1897 (n. 1810); referred to *A. latifolia*, though with no reason; for the plant is of that group to which *A. cordifolia* belongs, rather than an ally of *A. latifolia.*

A CHIONOPHILA. Dwarf, usually 5 to 10 inches high, monocephalous, and with but a single pair of cauline leaves, these inserted toward the base of the long naked peduncles;

whole herbage thinly tomentulose, and with abundance of small sessile resinous glands on both faces of the leaves; the lowest of these round-ovate, acute, nearly entire, $1\frac{1}{2}$ inches long and almost as broad, not cordate, their petioles as long, stoutish and flattened; cauline pair, subcordate-deltoid, on winged petioles dilated at base: peduncle not slender, notably striate, viscidly glandular and villous under the involucre; this $\frac{3}{4}$ inch high, broadly turbinate, its bracts uniserial, lanceolate, glandular and puberulent: rays neither numerous nor large, rather pale, 5 to 7-nerved, not notably toothed or notched: achenes glandular-scaberulous; pappus copious, white, barbellate.

Near the summits of the Ruby Mountains, Nevada, in the vicinity of perpetual snow, 20 July, 1896, collected only by the writer.

A. GRANDIFOLIA. A foot high or more with about 3 pairs of cauline leaves, and a solitary rather long-peduncled head of middle size; whole plant glabrous to the unaided eye, except for a scanty villous hairiness at base of involucre: lowest leaves 3 inches long, on petioles as long, ovate-cordate, coarsely serrate-toothed; lowest cauline pair more than twice as large (5 or 6 inches long and nearly 3 in breadth), oblong-ovate or elliptic-oblong, coarsely and doubly serrate-toothed, the blade decurrent on the short petiole, a lens disclosing a hirsute-ciliate margin, the uppermost pair triangular-lanceolate, sessile, simply and sharply serrate-toothed: involucre more than a half-inch high, its thin bracts lanceolate, almost uniserial, ciliolate: rays faintly 5 to 7-nerved, scarcely toothed at apex: disk-corollas with teeth pubescent externally: achenes hirsutulous above the middle; pappus white, barbellate.

The type thus defined is from near Bridger Pass, Montana, being n. 896 of Flodman's collection as represented in my

set of Flodman's plants. It has been mistaken for a form of *A. cordifolia,* from which species it recedes in its very large cauline and small radical leaves, the absence of all pubescence, relatively small and always solitary head, and in some minor points. In a large-leaved plant like this, and from that region, one would like to recognize the long suppressed *A. macrophylla,* Nutt. But our plant is far from answering the description of that species; which after all is perhaps a mere synonym of *A. cordifolia,* Hook., a species which, however, neither Nuttall nor any one else could ever identify from Hooker's character of it.

A. SUBCORDATA. Less than a foot high, the elongated monocephalous peduncle longer than the leafy stem; both stem and peduncle strongly striate, and, with the petioles of the leaves, sparingly villous-hirsute: leaves ovate and ovate-cordate, coarsely serrate or toothed, the largest 1½ inches long, on petioles as long, both faces rather sparingly and minutely pubescent; the reduced uppermost part deltoid-ovate, cuneate at base and sessile, entire: involucres large for the plant, fully ¾ inch high, the lance-linear acuminate bracts scarcely biserial, more or less villous-hairy and minutely glandular: rays light-yellow, long and narrow, 3 to 5-nerved, apparently acute and usually quite entire at tip: achenes hirsutulous and puncticulate; pappus very fine and white, merely serrulate-scabrous.

An exceedingly well marked small species, allied to *A. cordifolia,* obtained in 1898, by Mr. W. Spreadborough, on the Athabasca River. It is in the Canadian Survey Herbarium, and in that of the Catholic University, under the number 19,644.

A. VENTORUM. Size and habit of *A. cordifolia,* more slender, with thin and delicate glabrous foliage: radical

leaves from almost orbicular to cordate-ovate, 2 or 3 inches long, on petioles as long; cauline ovate or oblong-ovate, mostly in two pairs only, sessile; all repand-denticulate, delicately ciliolate, otherwise glabrous: heads 1 to 3, long-peduncled; involucres narrow and somewhat turbinate, of about 10 thin and green elliptic-lanceolate acuminate ciliolate and slightly glandular-puberulent bracts: rays rather few, deep-yellow, 7-nerved, 3-dentate, the middle tooth notably larger than the other two: achenes glandular-scabrellous; pappus fine, white.

Wind River Mountains, Wyoming, 11 Aug., 1894, A. Nelson; distributed for *A. latifolia*, for which it has no affinity.

Some Rudbeckia Segregates.

By Thomas V. Moore, C. S. P.

An examination of the copious material of "*Rudbeckia hirta*" preserved in the Herbarium of the Catholic University made a year since, led me to doubt that all the different forms labelled with that name ought to be included under that specific name; and subsequent study of this same material augmented by the numerous sheets contained in the U. S. Herbarium, has led me to propose as new a number of segregates.

The typical *R. hirta* can be identified easily, by reference to the figure and full description given by Dillenius, on which figure and description Linnæus founded the species; and I offer at the outset the following new description of this type; a description drawn from that common plant of Maryland and the District of Columbia which answers to the figure and diagnosis made by Dillenius in 1732, under the name *Obeliscotheca integrifolia*, etc.

R. HIRTA, Linn. Sp. Pl. p. 907. Perennial, 1 to 2 feet high, stoutish, erect, branching: stem, striate, hirsute: basal leaves oblong-spatulate, 2½ to 4 inches long, tapering to margined petioles about 1½ to 2 inches long; cauline leaves lanceolate-spatulate sessile by a dilated and half clasping base; all 3-nerved obtuse, entire or remotely serrate-toothed, strigose-hispid: peduncles 6 to 8 inches long, hirsute: involucral bracts about 1 inch long, oblong-linear, hirsute, in age thickened and prominently pustulate: rays, 12 to 15, oblong, orange-yellow: disk conical, dark purple, style tips slender-subulate: achenes quadrangular: chaff with hispidulous summits, glabrous below: pappus none.

The stout branching plant best answering to the description and figure of Dillenius is common in the District of Columbia and elsewhere both eastward and westward; and I found it plentiful, last summer, near Lake George in northern New York. It is sometimes nearly simple and quite slender, with narrow leaves. Such forms were collected at Green's Farms, Conn., by C. L. Pollard in 1894: in Minnesota by W. D. Frost in 1892: in Iowa by B. Fink (No. 285) in 1894; and in Buckhannon, W. Va. by W. M. Pollock in 1895.

Messrs. Britton and Brown in their *Illustrated Flora* (iii, 416) give the following data concerning the habitat of this plant: "In fields, Quebec to western Ontario and the Northwest Territory, South Florida, Carolina and Texas. Native only on the western prairies. Widely distributed in the East, as a weed." Now, as regards this last statement, which is certainly very erroneous, it is to be noted that, in the year 1732, when Dillenius published this species, he said that its habitat was America, especially Maryland, Virginia and Carolina. And it seems incumbent

on Messrs. Britton and Brown to tell how it was, that this plant was introduced from the prairies into the southeastern United States almost a century before the prairies were known, or any of the plants peculiar to them. There seems no reason whatsoever for saying that *R. hirta* is "native only on the western prairies," rather than of those localities in which Dillenius knew that it grew when describing it; and that so long before the prairie botany began to be known, or prairie plants had any means by which to migrate eastward.

R. FLORIDANA. Perennial, erect, with striate, hispid stems fastigiately branched: cauline leaves scabro-hispidulous, oblong or lanceolate-oblong, rather conspicuously serrate-toothed, acute, the lower tapering to narrowly winged petioles; the upper sessile and semiamplexicaul: peduncles from hispid to glabrous, 8 to 12 inches long: involucral bracts oblong or linear-oblong, nearly ½ inch long: rays 10 to 12, linear-oblong, an inch long or more: disk hemispherical.

Specimens collected by Geo. V. Nash (No. 2272), at Sanford, Orange Co., Fla., in 1895, and labelled *R. bicolor*, Nutt. Its short stiff pubsecence, short involucre and hemispherical disk clearly distinguish this from *R. hirta*, Linn.; while the perennial root altogether forbids its classification with the *bicolor* of Nuttall, which is an annual.

Var. ANGUSTIFOLIA. Simple or branched from near the base, more slender than the type; and sometimes monocephalous: basal leaves narrowly spatulate-lanceolate, remotely serrulate, about 2 inches long; cauline 1-nerved, linear to linear-lanceolate or oblong.

Specimens collected by Rev. A. B. Langlois at Manderville, La., in 1893.

R. AMPLECTENS. A slender perennial about 18 inches high with simple, sparingly hispidulous stem: the lower cauline leaves lanceolate-spatulate, entire or remotely denticulate; the upper oblong, subcordate, clasping; all 3-nerved, somewhat reticulate-venulose, appressed-pubescent and acutish: peduncles about 6 inches long: involucral bracts numerous in several series with appressed bases and the herbaceous free portion about 2 inches long, lanceolate-oblong, reflexed, strigose-hispidulous: rays 8 to 9 linear-oblanceolate, 1 inch long; disk, low, conical.

Specimens collected by Mr. G. McCarthy (No. 28), near Rome, Ga., in 1888; preserved in the United States National Herbarium under the name *R. hirta.*

Quite unlike any other species of this group. Possibly nearest to *R. truncata*, small, of which no specimens have been seen by me; but it has not the prominently 3-nerved, linear-oblong to linear leaves attributed to that. Besides, its involucral bracts are broader, longer and more foliaceous. This plant may be identical with one Mr. Small has seen in the Columbian University [Chapman Herbarium], "collected many years ago at Rome, Ga.," but it is certainly distinct from his *R. truncata.* (Cf. Small. Bull. Torr. Club, xxv. 478.)

R. DIVERGENS. Perennial, with divergently branching stem, about 3 feet high, sparingly beset with a fine, white, hirsute pubescence: basal leaves oblanceolate on slender petioles, the lower cauline spatulate-lanceolate, remotely serrate-denticulate; the upper linear-oblong, entire or remotely serrate-denticulate; all faintly 3-nerved and strigose with fine white hairs: peduncles tortuous, about 12 inches long, glabrate: involucral bracts short, about 6 lines long, oblong-linear or linear-lanceolate, hispid: rays 8 to 12 linear-oblong, light yellow, fading greenish: disk depressed-globose of a light brown.

Specimen collected by Mr. A. H. Curtiss (No. 4,759) in the pine barrens near Jacksonville, Fla., and observed in the United States National Herbarium under the name of *R. bicolor*, Nutt. The light brown disk alone would distinctly separate this plant from all other members of this group.

R. LONGIPES. Perennial, slender, about 2 or 3 feet high, with several sparingly hispid stems from the same root: basal leaves, lanceolate, tapering equably at both ends, acutish, remotely denticulate; petioles very slender, 4 to 8 inches long, hispid; lower cauline lanceolate, subentire, about 3 inches long, with margined petioles about 1½ inch long; the upper oblanceolate, entire, sessile; all 3-nerved, strigose: involucral bracts oblong-linear, hispid: rays 12 to 13 light yellow, linear: disk short, conical.

Specimens collected by Geo. G. Grower at Laberg, N. Y. in 1884: by J. B. Brinton at Flat Rock, Penna. in 1888: by L. H. Pammel (No. 55), at Ames, Iowa. It was labelled *R. hirta*; but its more slender and simpler habit, the very long petioles of its root-leaves, its longer and narrower involucral bracts and rays do not allow of its being classed with the *R. hirta* of Linnæus.

R. SERICEA. Probably perennial: simple, erect, sparingly hispid: basal leaves not seen: cauline linear-lanceolate, remotely toothed, obtuse, about 3 or 4 inches long, 3-nerved, the veins being white below but above inconspicuous of themselves, yet their direction is plainly marked by the silky canescent pubescence, which is especially heavy at each vein; the lower gradually taper to margined petioles: involucral bracts ¾ inch long, lanceolate subulate, pustulose-hispid: rays about 12, linear oblanceolate, more than 1½ inch long: disk rounded conical.

Specimen collected by B. F. Bush (No. 137), in Shannon County, Mo.; and deposited in the United States National Herbarium. It was labelled *R. hirta*; but its leaves are remarkably different from all others in this group, both in outline and pubescence. The long and narrow involucral bracts and the differently shaped and larger heads also distinguish this plant from *R. hirta.*

R. FLAVA. Possibly annual: simple, hirsute, the glossy whitish stems, 12 to 18 inches high, purple-dotted: basal leaves about 3-inches long, oblong-lanceolate, tapering spatulately to a petiole about 2 inches long, remotely denticulate or entire, obtuse, 3-nerved, strigose; the lower cauline lanceolate, tapering spatulately to a broadly margined petiole, that is plainly marked by a sharply defined more or less broad, white vein, subentire, finely strigose: peduncles 3 to 8 inches long, hirsute: involucral bracts oblong-linear, 8 to 10 lines long, hispid with fine white hairs: rays ovate-oblong, 1 inch long, of a very light-yellow in comparison with those of the eastern species.

Specimens collected by Aven Nelson (No. 600) near the Big Muddy, Wyoming, in 1894: by Dr. Greene near Bear Creek, Col., on his journey of 1889, and by Crandall and Cowen (No. 277) in the Foot Hills of northern Colorado. The light-green leaves and straw-colored glossy stems give this plant an aspect which is wholly unlike that of its eastern analogues.

R. BICOLOR, Nutt. Jour. Acad. Philad., vii, 81. Annual, 12 to 14 inches high, stoutish, erect, simple or sometimes branched: stem striate, hispid: basal leaves lanceolate-ovate, spatulate, cauline leaves lanceolate, oblong, sessile; all triple-nerved, obtuse, subentire, strigose-hispid: peduncles short, 2 to 3 inches long, hispid or hirsute: involucral

bracts oblong-lanceolate, hispid, pustulate: rays 10 to 14, oblong, short, less than 1 inch long, glossy and purplish-black below, yellow above: disk hemispherical, dark purple, style tips: achenes and chaff as in *R. hirta.*

Found by Nuttall in Arkansas and near the Red River.

R. FLEXUOSA. Probably an annual or biennial, with a stoutish, flexuous stem about 18 inches high, divergently branched from near the base, hispidulous: basal leaves oval, strigose-hispidulous, obtuse, on margined petioles; the lower cauline oval with a short, spatulate base, remotely crenate-toothed; the upper lance-ovate, sessile; all obtuse, 3-nerved and strigose-hispidulous: involucral bracts ovate-lanceolate, ½ inch long or more: rays about 8, linear-oblong, little longer than the involucral bracts: disk short-cylindraceous.

Specimen collected by A. A. Heller (No. 1751) near Gregory, San Patricio County, Texas; deposited in the United States Herbarium and labelled *R. bicolor.* The divergently branched, flexuous stem and the very broad leaves are characters which do not belong to *R. bicolor*; which is of simple habit and has much narrower leaves. Then, too, the pubescence of Nuttall's plant is longer than in this one and the short-cylindraceous disk of *R. flexuosa* makes it altogether unique in this group of Rudbeckias.

A DECADE OF NEW GENTIANACEÆ.

Among Rocky Mountain representatives of the genus GENTIANA, the following species hitherto unrecognized require definition:

G. BRACTEOSA. Akin to *G. Parryi,* more erect, more

than twice as large, usually more than a foot high, leaves more ascending, much narrower, never of ovate but always elliptic or lanceolate outline, the uppermost ones, closely subtending the flowers, much larger than the others and appearing as thin subscarious bracts of ovate-lanceolate outline, often $\frac{2}{3}$ as long as the corolla: calyx-tube thin, almost cylindric, *i. e.*, little dilated, the teeth relatively small and short, not $\frac{1}{3}$ the length of the tube: deep-purple corolla $1\frac{1}{2}$ inches long, its lobes ovate, acutish, the short folds bipid and also somewhat lacerate or incise-serrate: seeds of variable outline but mostly oblong, winged at base and often along one side, the wing narrow, sometimes continued also across the summit.

This excellent, large and beautiful species I judge to have been imperfectly known to Dr. Englemann, whose "narrow-leaved form" of *G. Parryi* appears to have been this; and the specimens of that species given me by Dr. Parry himself twenty years ago out of his original material are partly this. But I confess I can not understand how a botanist of Dr. Engelmann's attainments, noticing the narrow foliage, could have overlooked the conspicuous large thin bracts which mark even the smallest specimens of this as wholly distinct from *G. Parryi*. And the lobes of the corolla, obovate and cuspidately acute in *G. Parryi*, are here about as nearly ovate as possible, with never a trace of the cusp or abrupt apical point. *G. bracteosa* belongs properly to southern Colorado, as *G. Parryi* to the northern portion of the State. My typical specimens are of my own collecting, at Marshall Pass in 1896, supplemented by most excellent ones by C. F. Baker, from near Pagosa Peak, 28 Aug., 1899. Mr. Theo. Holm brought it the same year from Mt. Massive, near Leadville, at an altitude of 11,000 feet.

G. INTERRUPTA. Allied to *G. affinis*, taller, erect, 1 to 1½ feet high, glabrous, rather densely leafy near the base, otherwise with scanty foliage, the upper pairs of leaves of less than half the length of the internodes; lowest leaves oblong or elliptic-oblong, the others oblong-linear, all somewhat widely spreading, rather small, the longest barely 1 inch long: inflorescence sparse and elongated, the more or less remote upper nodes bearing each a pair of erect peduncles 1 to 2 inches long, bracted at summit and with 1 to 3 flowers: calyx with narrowly turbinate tube subscarious below the sinuses, and short unequal herbaceous teeth, these linear or subulate-linear: purple-blue corolla small and narrow, the largest barely 1 inch long; short lobes ovate, acutish; folds very short, setaceously cleft.

In meadows along streams at Pagosa Springs, southern Colorado, 30 Aug., 1899, C. F. Baker. Remarkable among gentians of this group for the long and notably interrupted inflorescence.

G. REMOTA. Size and habit of the last, with similar foliage and almost equally interrupted inflorescence, but the flowers few, solitary both terminally and as to the axillary peduncles: calyx-tube narrowly turbinate, herbaceous, as also the oblong equal teeth or segments, these almost as long as the tube: corolla expanding and funnelform, with very short, broadly obovate abruptly acute lobes and very short lacerate folds.

Meadows of the Humboldt River at Deeth, Nevada, scarce; collected only by the writer, 5 August, 1895.

G. DISTEGIA. Annual, from a few inches to more than a foot high, mostly simple, with few pairs of leaves and long internodes and flowers in all the axils except the very basal ones, these either solitary and very long-peduncled, or else

with one or more very short-peduncled ones from the same axil, the terminal flower quite as often solitary, but not as long-peduncled as the main lateral ones: herbage glabrous: leaves oblong or oblong-lanceolate, 1 to 1½ inches long, obtuse, sessile, the very lowest more usually obovate and narrowed to a not very short petiole: flowers nearly ¾ inch long: calyx with 2 greatly enlarged and bract-like sepals of ovate outline, apparently opposite, and completely enfolding the 3 shorter linear lanceolate ones, these larger more than equalling the tube of the corolla; this from deep blue-purple to lurid and greenish-purple; only the rotate limb exserted.

High mountains about Pagosa Peak, southern Colorado, C. F. Baker, August, 1899. A member of the *Amarella* group of gentians, most related to *G. heterosepala*, but the calyx, as well as the habit and inflorescence of the plant, very different. I am not sure that the large bract-like organs below the flower are not a real involucre, and that the three segments within them alone represent the calyx.

The specimens have been distributed from different altitudes under two names. The plant from the greater elevation, 12,000 feet, smaller and otherwise peculiar in color of flowers and general aspect is the one which, in Mr. Baker's distribution, bears the name *G. distegia*, the larger one, with lurid corollas, from an altitude of 9,000 feet, was named *G. anomala*; but I do not now find characters for two species. But the names may stand according to the tickets, with the small plant for true *distegia*, should two species hereafter be well made out.

I have long doubted that our North American representation of the genus SWERTIA is rationally to be accepted as constituting but a single species, and that the whole or any

part of the material is properly referable to the Old World *S. perennis.* The only species often collected with us, and common in herbaria under the name of *S. perennis,* is a Rocky Mountain plant, subalpine or even alpine as to its habitat, and very unlike the real *S. perennis,* both in habit and floral characters. The European plant has a somewhat loose and panicled inflorescence, with pentamerous flowers, while in ours the inflorescence is very strict and thyrsiform and the flowers tetramerous. The nectaries in the former are fringed with copious long and quite capillary appendages, while in ours they are bordered by only a few short dilated and broadly subulate ones. These are specific characters of the first class; and the discovery of them necessitates the recognition of a new species which I name:

S. SCOPULINA. From a few inches to nearly two feet high: inflorescence very strict: broadly oblanceolate or spatulate-oblanceolate radical leaves very large, often of more than half the length of the subscapiform stem, usually all, even the lowest and largest cauline ones alternate, with broad winged petioles and half-clasping: flowers 4-merous: sepals lanceolate-subulate, often 3-nerved and three-fourths as long as the corolla-lobes, these fully one-half inch long, dark blue-purple: glands subulate-fringed: seeds round-obovate varying to somewhat quadrangular, very distinctly winged on one, two or three sides, the testa wrinkled.

Common in the subalpine districts of middle and southern Colorado; the best specimens. those of my own collecting on Little Ouray Mountain, near Marshall Pass, 3 Sept., 1896. I think all the Rocky Mountain *Swertia* may belong here; yet am not positive of that.

S. OCCIDENTALIS. Commonly a foot and a half high: leaves all opposite, the lowest pair oblong, obtuse, 3 to 4

inches long including the broad petiole of an inch or more, the proper cauline ones much reduced, sessile, often in 3 or 4 pairs: flowers 4-merous, 1 to 3 on each of a half-dozen peduncles axillary to the bracts: sepals lanceolate, broad, scarcely acute: segments of the corolla oblong, very obtuse, of a pale lurid purplish color, the glands bordered by few and subulate-setaceous appendages.

Wet banks and bars of Hurricane Creek, eastern Oregon, W. C. Cusick, 25 Aug., 1898 (under n. 2100 in my set). A species remarkably well characterized by its very obtuse corolla-lobes, and very coarse fringe of the glands.

S. ovalifolia. About a foot high; leaves small, opposite, the oval or often elliptical acutish blades 1 to 2 inches long, on petioles somewhat shorter: flowers 5-merous: sepals triangular-lanceolate, acute; corolla of a light blue-purple, its segments oblong, acutish, the glands bordered with a dense slenderly setaceous rather than capillary fringe.

Alpine bogs in the Blue Mountains, Oregon, collected by W. C. Cusick, the date not indicated in so far as I have seen. Beautifully distinct by a small ophioglossaceous foliage and rather large pentamerous flowers.

The following species of Frasera seem to deserve recognition.

F. venosa. Solitary stem and elongated inflorescence about a yard high; herbage pale-green, retrorsely hirtellous-puberulent throughout: lowest leaves 8 to 14 inches long, elliptic-lanceolate, acute, very strongly 5-veined or almost ribbed from base to apex, the midrib and parallel veins very prominent beneath and whitish: lance-linear sepals

not equalling the corolla: lobes of the corolla obovate, cuspidately acute; gland concealed by the long dense fringe; divisions of the crown quadrate, setaceously cleft to near the middle.

Species collected by myself on hills near Santa Rita del Cobre, New Mexico, in 1880, and distributed for *F. speciosa*, from which its peculiarly almost ribbed and narrowly elliptic foliage no less than the floral characters well distinguish it.

F. AMPLA. Plant 5 feet high or more and with a narrow and subcylindric inflorescence: herbage not pale, but minutely hirtellous-scaberulous: lowest leaves 12 to 18 inches long including the narrow and distinct petiole, the blade obovate-elliptic, acute, 5 inches broad, with a midvein and about 6 somewhat divergent lateral veins, none prominent: linear-lanceolate sepals only about two-thirds the length of the corolla: lobes of the corolla obovate-oblong, obtuse; ciliation around the gland rather coarse; divisions of the crown cleft unequally and almost to the base.

Common in the mountains of northern Arizona; here described from specimens obtained by myself on Mt. Bill Williams, 4 July, 1889.

F. MACROPHYLLA. As tall as the last, or taller, the inflorescence more loose and open, the foliage much larger; herbage deep-green, glabrous: lowest leaves 16 to 20 inches long, thinnish, broadly oblanceolate, obtuse or only abruptly and cuspidately acute, distinctly about 9-nerved, but no nerves or veins prominent: sepals equalling or exceeding the oblong-obovate petals; copious ciliation slender and long; divisions of the crown cleft to near the base, the segments colored at tip like the corolla lurid-purplish.

Rich hillsides about Pagosa Springs, Colorado, 25 July, 1899, C. F. Baker.

Studies in the Cruciferæ.—III.

1. *Certain species of* Arabis.

I have made repeated careful and laborious efforts to ascertain to what extent genuine *Arabis Holbœllii*, a Greenland plant as to the original, is indigenous to British America and the United States. And while the results attained can not be considered final, I think it well to put them upon record.

And for one thing, I am convinced that *A. Holbœllii* does not occur, so far as known, upon United States territory; nor have I yet met with satisfactory evidence of its occurrence on this continent; though it is to be expected from very far northward, along the shores of the Arctic seas. Our Rocky Mountain and other far western and northwestern plants that have been so referred must, it seems to me, be treated as fair subspecies at the least. A number of such segregates have already been proposed, and I shall here present the characters of several more.

But first of all, I shall attempt, what seems never yet to have been given, a real diagnosis of the original of this group, which has hitherto been recognizable only by means of the plate in the *Flora Danica.*

A. Holbœllii, Hornem. Stem stoutish, simple, 6 inches high or more, very leafy below; leaves about ¾ inch long including the short distinct petiole, the blade lanceolate, acutish, entire, the whole canescent with a minute stellate pubescence; cauline leaves few, oblong, sessile and auriculate- or subsagittate-clasping, either wholly glabrous, or the

auricles with a few marginal forked hairs; stems and also pedicels of the flowers glabrous: flowers rather more than ¼ inch long (much larger than in the U. S. segregates); sepals with a few scattered stellate hairs and a conspicuous white scarious margin; petals twice the length of the sepals and with broad round-obovate somewhat spreading limb, apparently white, acquiring a blush of rose in drying: anthers sagittate: ovaries and young pods glabrous: pods somewhat deflexed.

This description is drawn up from Greenland material in the herbarium of Mr. Theo. Holm collected by himself; and I have seen no even high-northern continental specimens that match them. The nearest approach to them is made by Canadian specimens which, as I suppose, fairly represent the following:

A. RETROFRACTA, Graham. While closely resembling *A. Holbrœllii* in habit, and the pubescence of the leaves, the stem is more hirsutulous than stellate-hairy; the radical leaves are not entire but dentate; the flowers are of only half the size, much more numerous, and with rose-colored petals which are spatulate-oblong, with little distinction of claw and limb, and the exserted portion is stellate-roughened up and down the middle of the back; and lastly, the pods are longer and narrower, on shorter pedicels, and distinctly refracted, *i. e.*, holding a position almost parallel to the axis of the raceme.

This plant is well illustrated in the Canadian Survey Herbarium at Ottawa, under n. 10,304, from Wood Mountain Post, Assiniboia, 10 June, 1895, and by n. 18,110, from Crow Nest Pass, Alberta, Aug., 1897, both collected by Mr. John Macoun. I note that Mr. Howell, in his *Northwestern Flora*, has taken up the name *A. retrofracta*, but, as it appears from the description, for a plant very different from this.

A. RHODANTHA, Greene, Pitt. iii, 155. While differing from *A. Holbœllii* very markedly in its long loose raceme of small rose-red flowers, as well as in its short-pedicelled refracted pods, this Colorado plant has no simple hairs, its stem, glabrous above, exhibits only the usual very fine stellate pubescence on its lower part. As a species, it is about equally removed from the two preceding; and the three are near allies.

A. SECUNDA, Howell, Eryth. iii, 33. An excellent species, with better characters than Mr. Howell assigned. The stellate pubescence is both more scanty and more soft than in any of the foregoing, and is nowhere more pronounced than on the pedicels, and it recurs, though sparingly, on the perfectly mature pods; and the valves of these are singularly almost carinate-nerved, while between this midnerve and the margins the space is occupied by a system of narrow almost linear reticulation, or series of interrupted striations, as the lines might perhaps better be called.

A. TENUIS. Perennial, the younger plants simple and with a simple raceme, the older with branched and lignescent but slender caudex; flowering stem and raceme mostly about a foot high, very slender, erect and strict: lowest leaves oblanceolate, petiolate, entire, the whole about $\frac{3}{4}$ inch long, both faces finely stellate-canescent, the indument extending to stem and cauline leaves, and even to pedicels, calyx and growing ovary: cauline leaves linear, broadest at the slightly auricled base: flowers very small, the spatulate white or pinkish petals about twice the length of the sepals: pods very narrowly linear, about 2 inches long, straight, closely deflexed on short and slender pedicels, obtuse or acutish: seeds uniserial, orbicular, wingless, though with a slight scarious margin.

Mountains of eastern Washington, collected by Suksdorf, in 1884 and 1885, and also in northeastern California, Mrs. Austin, 1894. Species well marked in character, and with the narrowest of pods; the whole plant being very slender.

A. CONSANGUINEA. Stems solitary, or several from as many branches of the caudex, erect, simple or somewhat branched as to the inflorescence, 10 to 16 inches high, stoutish, lowest leaves about an inch long including the oblanceolate serrate-toothed blade and narrow petiole, canescently stellate-tomentose without other pubescence, the lower cauline nearly as long, spatulate-lanceolate, dentate, sessile but scarcely auricled, the uppermost oblong, often entire, auriculate-clasping, these stellate-hairy only beneath, all the lower equally so on both faces: racemes rather short, the rachis occasionally and the pedicels usually stellate-pubescent: flowers about 1½ lines long: sepals stellate-hispidulous, also usually the young ovaries: petals erect, oblong, pinkish: anthers oblong-linear, auriculate at base but not sagittate: pods narrow, nearly straight, moderately deflexed on curved pedicels, but not refracted; the valves 1-nerved: seeds distinctly biserial.

Obtained at Los Pinos, southern Colorado, 18 May, 1899, by C. F. Baker.

A. ARIDA. Perennial, the several stoutish rigid stems about a foot high, the whole plant even to the pods hoary with a white pubescence chiefly low and stellate, but in part consisting of longer and divaricately forked hairs: lowest leaves oblanceolate, petiolate, dentate; cauline oblong, entire, sessile by an auricled base: flowers not known: pods deflected on very short pedicels, purplish but rather densely stellate-tomentulose, rather broad and obtuse, the stigma sessile: seeds in one row.

Collected at Moor's Station among the dry hills of eastern Nevada, 16 July, 1896, in fruit only. Allied to *A. subpinnatifida*, but the leaves different and pods very characteristic, being obtuse, the vacant apex broad and flat.

A. RECTISSIMA. Rigidly erect, simple and rather slender, 14 to 18 inches high, very glaucous throughout, glabrous except as to the basal leaves, these spatulate-lanceolate, an inch long or somewhat less, loosely ciliolate, with short, rigid, mostly simple, hairs, both faces sparsely setulose-hispid, the hairs commonly forked: cauline leaves nearly glabrous, their few setulose hairs usually simple: fruiting raceme often a foot long: pods 2 to 3 inches long, $\frac{3}{4}$ line wide, very straight, strongly refracted on short pedicels, acute; valves 1-nerved: seeds uniserial, narrowly winged.

Known only from middle elevations in the mountains of Fresno County, California; collected by Mrs. Peckinpah in 1890.

A. DURIUSCULA. Suffrutescent, rather slender, 2 feet high, the naked woody stem below the leafy and floriferous branches often 6 to 10 inches high; the clustered leaves subtending these oblanceolate, acute, entire, about $\frac{3}{4}$ inch long, thickish, glaucous, very minutely pubescent with short hairs divaricately forked or branched at summit; scattered cauline leaves $\frac{1}{2}$ inch long, oblong, sessile by a broad but scarcely auricled base, glabrous and glaucous, as also the stem and pods: flowers 10 to 15, very small, the reddish petals little surpassing the calyx and erect: pods deflexed, about $2\frac{1}{2}$ inches long and a line wide, the valves 1-nerved and venulose: seeds in two rows, small, winged.

Known to me only from the vicinity of Donner Lake, in the Sierra Nevada of middle California, where it was collected by Miss Michener in 1893; and Mr. Sonne distributed

it from the same vicinity as early as 1882, supposing it to represent *A. suffrutescens*, to which it is truly related, but is a many times larger plant, with long racemes of pods; and it has not at all the notably ligneous stem of that species.

While all the foregoing are characterized, as a group, by their deflected or refracted pods, those next succeeding exhibit siliques borne more or less horizontally on usually stout and divaricate pedials. They are largely segregates of the so-called *A. arcuata*, Gray, which name is not tenable for any American *Arabis*, being preoccupied for an European species, or subspecies of *A. alpestris*, published much earlier by Shuttleworth.

A. MAXIMA. *Streptanthus arcuatus*, Nutt. T. & G. Fl. i, 77. *Arabis arcuata*, Gray, in part. Stems stoutish and tall (2 feet high or more), numerous, one from each branch of a multicipitous woody caudex: basal leaves numerous and tufted, commonly 1½ to 3 inches long, oblanceolate, often very narrow, conspicuously toothed or subentire, marked with a strong white midvein, canescent on both faces with short branched hairs; cauline 1 to 1½ inches long, lanceolate, acuminate, sagittate-clasping, with the usual pubescence, this extending to the stem, pedicels and calyx: flowers large (about ½ inch long); calyx purplish, corolla deep red-purple.

Mountains of southern California, from Santa Barbara and Mariposa Counties southward to the peninsula. The long pods are distinctly curved, though less notably so than in some of the succeeding species which were erroneously referred here by A. Gray.

A. CAMPYLOLOBA. Perennial, but lacking the freely

branching ligneous caudex, the stems usually few or solitary, often 2 feet high, the racemes both in flower and fruit longer and looser than in *A. maxima*, the pale flowers not half as large: tufted basal leaves broadly oblanceolate, acute, with few and coarse teeth or none, the midnerve not conspicuous, the whole leaf 1 to 1½ inches long, the pubscence dense on both faces and more nearly stellate: lower cauline leaves spatulate, with dilated petiole and strongly serrate-toothed blade, the upper oblong, sagittate-clasping and revolute: stem sparsely hispid with nearly or quite simple hairs; pedicels and calyx with a denser more branched but hispid rather than stellate hairiness: petals rose-color: pods glabrous, more than 3 inches long, strongly curved downwards on very short (2 or 3 lines long) exactly divaricate rigid pedicels: seeds uniserial.

Very common in the middle mountains of the northern parts of California and adjacent Oregon and Nevada. An excellent type is my own "*A. arcuata*, Gray," from near Yreka, 1876. As the fruit is more strongly arcuate than in Nuttall's *S. arcuatus*, I have applied here the Greek equivalent of that homonym.

A. GRACILIPES. Size and habit of the last, less pubescent, more pronouncedly glaucous; leaves more ample and of thinner texture, the dentate basal ones asperulous with minute stellate hairs; cauline glabrous, ovate-lanceolate, sessile by a broad but only slightly auricled base, not revolute but the margins of all apt to be remotely denticulate: basal part of stem hispidulous with simple hairs, all the upper portion as well as the rachis of the raceme and the pedicels glabrous and very glaucous: sepals narrow, dendritic-hairy at the tips; petals narrow, far surpassing the calyx, rose-colored; filaments all elongated, those of even the short stamens surpassing the calyx; anthers unusually

short, ovate-oblong: pods about 2½ inches long, acutish, curving downwards on slender spreading or recurved pedicels of an inch or more: seeds very distinctly biserial.

Mountain districts of northern Arizona about Flagstaff. This might perhaps include the *A. arcuata* var. *longipes* of Watson; but that varietal name is not available for the species, there being an European *A. longipes* of recent date

A. GRACILENTA. Perennial, with a number of slender erect or ascending stems from the root, and several short leaf-bearing shoots intermixed, the tallest stems scarcely exceeding a foot in height; herbage pale and glaucescent as well as subcinereous with a minute branched pubescence which, under a strong lens, is seen to be dendroid rather than stellate: lowest leaves (on sterile shoots) narrowly oblanceolate, entire; cauline oblong-linear, sessile and with somewhat hastately divergent auricles: racemes slender and few-flowered: sepals thin and with purple-scarious margins; petals also thin, of more than twice the length of the sepals, with rather broadly spatulate and delicately venulose rose-purple limb: pods glabrous, about two inches long, narrow, straight or nearly so, on filiform slightly decurved almost divaricate pedicels: seeds in two very closely contiguous rows.

An elegant and most distinct new member of this group, known to me only in Mr. Heller's collection from the vicinity of Santa Fe, New Mexico; the label reading, *more Helleriano*, "*Arabis Fendleri*, Heller. Authentic specimen, from type-locality." Nevertheless, nothing like the Fendlerian plant on which *A. Fendleri* should be based is in Mr. Heller's collection!

A. EREMOPHILA. General habit of the last, but caudex more loosely branched, the sterile shoots longer and more

loosely leafy; leaf-blades oblong-lanceolate, saliently dentate; branched pubescence more dense and less notably dendroid, *i. e.*, the branched portion more shortly stalked and subsessile: cauline leaves sparse, linear, with very short and inconspicuous auricles: rose-red petals small, not venulose: very narrow pods 1½ inches long, their pedicels almost or quite half as long, spreading: seeds in one row.

Common about Peach Springs, northern Arizona; flowering and fruiting in April. Also at Aztec, New Mexico, C. F. Baker, 3 May, 1899.

A. RECONDITA. General habit, inflorescence and small pods of the last two, but smaller, the foliage thinner, greener, with a sparse and minute stellate pubescence: leaves obovate, dentate, abruptly narrowed to a rather long and slender petiole, the base of this more or less notably ciliate with simple hairs, or hairs shortly and divaricately forked at the very summit: filiform pedicels glabrous, but calyx stellate-pubescent: petals rose-purple: pods glabrous, 1 to 1½ inches long, spreading, slightly curved: seeds imperfectly biserial.

Diamond Creek Cañon, a tributary of the Colorado, in northern Arizona, N. C. Wilson, April, 1893. Also, in larger form, less pubescent, and with narrower leaves, from Glenwood Springs, Colorado, Geo. E. Osterhout, 1899, labelled by him as *A. Lyallii*.

A. OXYLOBULA. Low, apparently suffrutescent, the slender stems only 5 inches high, shortly and loosely racemose at summit: tufted basal leaves about an inch long, narrowly oblanceolate, acute, entire, the slender petiolar base sparingly hispid-ciliate, otherwise glabrous, not at all glaucous; the 2 or 3 cauline oblanceolate, ½ inch long, sessile, not auriculate: pods about 5, linear, straight, about

⅜ inch long, acute, spreading or a little deflexed on short filiform pedicels; valves with a distinct midnerve: seeds imperfectly biserial.

Glenwood Springs, Colorado, 18 June, 1899, Geo. E. Osterhout. An elegant little species, somewhat allied to *A. Lyallii* but with excellent characters.

The next three are segregates of *A. Drummondii,* in so far as relates to material not of recent collection and to be found in various herbaria under that name. The pods in all are erect, and the pubescence of the group is peculiar, consisting of hairs split to the base, so to speak, and divaricately appressed.

A. Albertina. Stems rather low (5 to 7 inches high at flowering), rather numerous from a much branched thick and rather woody caudex, all very erect and strict; herbage of a vivid green, wholly glabrous except some traces of a deeply forked pubescence on the margins of the basal lanceolate leaves and their petioles: cauline leaves oblong, acutish, distinctly narrowed above the subsagittate-auriculate base: flowers few, about 4 lines long; calyx short, less than half the length of the obovate-dilated petals, these with spreading limb: fruit not seen.

Elbow River, in the Rocky Mountains of Alberta, John Macoun, 1897; Canad. Surv. n. 18,101. Easily distinct from *A. Drummondii* by its low stature and multicipital caudex.

A. oxphylla. Perennial, the 3 to 6 or 7 branches of the caudex each bearing a strictly erect stem 8 or 10 inches high at flowering time, much taller in fruit, the whole plant pale and glaucous, nearly glabrous, only the clustered lanceolate acute entire basal leaves with some of the divaricately, appressed binate hairs of this group: cauline leaves

very erect, appressed to the stem, lanceolate, acuminate, strongly auricled at the base: sessile raceme short, few flowered: flowers not small (about 4 lines long); sepals purplish; petals white or pinkish, the limb spreading: pods about 3 inches long, hardly a line wide, very erect; seeds in 2 rows.

Frequent in the mountains of Montana, Wyoming, and Colorado; in the southerly localities occurring at altitudes of 8,000 to 10,000 feet. Excellent specimens of my own collecting at Empire, Colorado, 1875, are before me, as well as a fine series of fruiting specimens from about Pagosa Peak, at 10,000 feet, by C. F. Baker, 1899. Its perennial root, glaucous hue, and long-pointed cauline leaves completely distinguish this from *A. Drummondii;* and the plant is less than half as large as *A. Drummondii.*

A. CONNEXA. Perennial, the stems solitary, or occasionally several, the caudex being branched, all very erect, 1 to 1½ feet high; basal leaves green, in no degree glaucous, mostly with a few of binate divaricately appressed hairs, oblanceolate, entire, acute, slenderly petiolate; upper part of the plant wholly glabrous and glaucescent: cauline leaves oblong-lanceolate, very erect, sessile and sagittate-clasping, the auricles broadly somewhat falcate: flowers not seen: pods few, very erect, commonly 4 inches long (2½ to 4½ in.), 1½ lines broad, the valves with a distinct midvein traversing an equally distinct, but shallow groove between the two rows of ovoid strongly winged seeds.

Mountains about Pagosa Peak, southern Colorado, at an altitude of 10,500 feet, growing in moist ground along with *Veratrum*, collected by C. F. Baker, 18 August, 1899. Manifestly a southern subalpine homologue of *A. Drummondii*, and very distinct by the character of its pods, as well as by the glaucescent stem and stem-leaves.

Of the two species concluding this fascicle, the first is a segregate of the well known *A. platysperma*; the other a remarkable new species whose affinities can not now be designated for want of mature fruit.

A. PLATYLOBA. Stems several, 6 to 10 inches high from a branched and suffrutescent base: herbage glabrous, scarcely glaucescent: basal leaves oblanceolate, acute, entire; cauline oblong, sessile by a broad but scarcely auriculate base: racemes mostly 2 to 4-flowered: pods erect, 2½ inches long, 2½ lines broad; valves not nerved, rather strongly reticulate, the meshes elongated: seeds broadly winged.

Lake Solfaterro, Lassens Peak, July, 1896, Mrs. Austin. Related to *A. platysperma*, but wholly destitute of the stellate pubescence of that species, and with broader leaves and pods, larger seeds, etc.

A. FORMOSA. Perennial, the one or several very erect and simple stems a foot high from a subligneous base; whole plant, even to the pods, canescent with a minute stellate indument: lowest leaves narrowly oblanceolate, 1½ inches long including the long rigid petiole, entire; cauline rather copious, as long as the others, sessile by a truncate but not auricled base: racemes long and loose, the flesh-colored flowers rather more than ½ inch long, at length deflexed: sepals finely and densely stellate; petals with spatulate-oblong spreading limb: pods (immature) pendulous.

Hills about Aztec, New Mexico, 28 April, 1899, C. F. Baker. A handsome and singular-looking *Arabis*, bearing some marks both of *Streptanthus* and of *Thelypodium*.

2. *Miscellaneous New Species.*

CHEIRANTHUS ARIDUS. Biennial and occasionally perennial, stoutish, rather rigidly erect, the strongly striate stem

about 10 to 16 inches high, simple, shortly racemose at summit: leaves canescent with a dense indument of the usual forked and appressed hairs, the tufted basal ones with erect petioles and spreading oblanceolate runcinate-toothed or entire blade, those next succeeding more conspicuously and pinnately runcinate, the teeth large and triangular, the upper cauline gradually shorter, linear, entire: flowers rather large, yellow; sepals pubescent, obviously saccate: pods not seen.

On dry hills among nut pines and cedars at Aztec, New Mexico, 27 April, 1899, C. F. Baker. Related to *C. argillosus* of the bluffs of the upper Arkansas, but taller, much less pubescent, and with a different foliage. The leaves are peculiarly rigid and fragile; nothing remaining of the basal tuft at flowering time except the petioles, the blades apparently having been broken off and swept away by the winds of winter. Most of the specimens are simple and seem to be biennial, but others have a branched caudex, as if surviving the biennial period.

Sophia procera. Annual, erect, 3 to 6 feet high, simple to above the middle, the whole upper portion forming a narrow and rather strict panicle of subsessile racemes: herbage appearing altogether green and glabrous to the unaided eye, but the stem and growing parts sparsely puberulent with minute forked or somewhat stellate hairs: leaves sessile, pinnate, the pinnæ pinnatifid, of lanceolate outline, acute: fruiting racemes mostly 3 to 6 inches long and strict, the pedicels slender, erect or merely ascending, about the length of the linear very acute 6 to 12-seeded pods, these 4 or 5 lines long.

Common in open pine woods of the Colorado Rocky Mountains, at 8,000 or 9,000 feet altitude. Excellent

specimens are in Mr. C. F. Baker's collection of 1899, from the high mountains about Pagosa Peak, southern Colorado. Thirty years ago, when I first saw and collected this subalpine woodland species, Dr. Gray considered it to be the Old World *Sisymbrium Sophia*; but he afterwards referred it to *S. Hartwegianum*, which is a Californian plant most unlike this in habit, and character of racemes and pods. It is by far the largest species of its genus, and does not flower until July or August.

THELYPODIUM SIMPLEX. Stem solitary from a biennial or perennial root, stout, erect and strict, 2 feet high or more, leafy to about the middle, thence racemose to the summit, the greatly elongated raceme strict, but not dense; the whole plant glabrous and very glaucous; the tufted basal leaves oblanceolate entire, scarcely exceeding an inch in length; cauline as long, lanceolate, sagittate-clasping, very erect: flowers white or flesh-colored, $\frac{1}{2}$ inch long; calyx saccate; petals nearly erect but well exserted, with broad claw and narrowly spatulate strongly crenulate limb: anthers sagittate: pods 2 inches long, nearly erect, slender, acute.

Subsaline meadows, Dixey Valley, Lassen County, California, 6 July, 1894, M. S. Baker.

THYSANOCARPUS FILIPES. Slender, branched from near the base and all the branches racemose: herbage scarcely glaucescent, deep-green: leaves of the stem (the lowest not seen) lanceolate, acuminate, sessile by a subhastate base: racemes dense: pods round-obovate, $\frac{1}{4}$ inch long, on filiform pedicels of $\frac{1}{4}$ to $\frac{1}{2}$ inch, the whole body of the fruit very minutely hirtellous, only obscurely venulose, the rays about 12, for the most part united near the summit and forming elliptic

infra-marginal perforations, the crenate diaphanous margin purplish: stigma included within a deep terminal notch.

Near Clifton, Arizona, Dr. Anstruther Davidson, 1899.

DRABA INTEGRIFOLIA. *D. cuneifolia*, var. *integrifolia*, Nats. Proc. Am. Acad. xxiii, 256. It was the one or two least important of the many peculiarities of this plant, namely, the entire leaves and the glabrous pods, which Mr. Watson had detected when he received it as a new variety of *D. cuneifolia.* Its obvious characters as compared with the real *D. cuneifolia* are (1) a lax raceme (2 inches long and of 8 or 9 pods in the largest specimens), (2) turgid pods (3) somewhat inclined to be falcate (4) not only glabrous; but notably recticulate, and (5) pointed by a stigma much more prominent than in any other member of this particular group of species.

CARDAMINE FOLIACEA. Perennial allied to *C. Breweri*, but taller and quite erect, scarcely leafy at base, but the stem above bearing numerous and ample very thin leaves, the fruiting raceme elongated and narrow: leaves commonly 3 inches long including the petiole, the terminal leaflet nearly 2 inches long, oval or round-ovate, coarsely but not deeply lobed, the lobes very obtuse or even almost truncate and mucronate, the 1 or 2 lateral pairs of less than one-fourth the size of the terminal, otherwise similar: fruiting receme 4 to 10 inches long: pods suberect on slender pedicels, very narrow, slender-pointed.

Species apparently common in the lake region of northern Idaho, thence eastward into Montana. Excellent Idaho specimens are in my herbarium from Leiberg (n. 171), Heller (n. 856) and J. H. Sandberg; and the species seems well represented in Flodman's n. 491 from the Spanish

Basin in central Montana. It is the most notably leafy of all our species, and the foliage readily suggests that of the common celandine. Its pods are very narrow, and only an inch long. By this and the leaf characters, as well as the upright habit and long racemes, it must be regarded distinct from the almost strictly Californian *C. Breweri* to which the specimens have been referred.

CARDAMINE ORBICULARIS. Perennial, with copious rather fine fibrous roots from about the summit of a short perpendicular rootstock: stem strictly erect, 1 to 1½ feet high, very thick, apparently somewhat fleshy, only very sparsely leafy, the foliage chiefly near the base: terminal leaflet an inch broad more or less, orbicular, the rounded basal lobes overlapping, thus completely closing the sinus, entire or slightly repand, retuse; the single lateral pair one-third as large, round-reniform, subsessile; the few leaves of the upper stem with more elongated and somewhat irregularly toothed leaflets: racemes several, short, narrow: pods suberect, ¾ inch long, obtusish, the stigma nearly sessile.

In swamps at the mouth of the Columbia River, Oregon, May, 1887, Thomas Howell; the specimens labelled *C. Breweri*, but the plant of very different root-growth and peculiar orbicular and subreniform leaflets, with also characteristic beakless pods.

CARDAMINE HEDERÆFOLIA. Stems several from a short branching and somewhat tuberiferous rhizome, stout, erect from a decumbent base, a foot high more or less, not leafy at base, only sparsely so above and the leaves comparatively small, rather fleshy, simple or trifoliolate, the terminal (often the only) leaflet about an inch wide and ¾ inch long, more or less angularly 5-lobed but not deeply so, the lateral pair when present small and about 3-lobed: flowers

white, rather large, forming a short, broad subcorymbose cluster; fruiting raceme short, the pods 2 inches long, slender, erect on pedicels of ½ inch or more.

Along streams at the eastern base of the Cascade Mountains in southeastern Oregon, Mrs. R. M. Austin, 1893.

CARDAMINE MODOCENSIS. Size and habit of the last, but slender rather than robust, much more leafy, the herbage deep-green and not succulent: leaves mostly simple, oval to rhombic-ovate, an inch long, ¾ inch wide, irregularly and acutely 5 to 7-toothed: flowers rather few, white; fruiting raceme short; pods slender, 1½ inches long on ascending pedicels less than half as long.

Plains of Modoc County, northeastern California, on Lassen Creek, Mrs. Austin, August, 1894, and on Davis Creek, Miss Black, in the same year; at the time referred by me to *C. Breweri*, but it is very distinct.

3. *Type of the Genus* DRABA.

The name DRABA was originally, and very anciently, associated with a plant which, since Linnæus' time, has been treated as a species of the genus *Lepidium*. The *Lepidium Draba* of that author is the type which, according to the law of priority should, along with its true congeners, constitute the genus DRABA.

However, as the law of priority is with most botanists of the present a mere name, being allowed to prevail only this side of a comparatively recent date, the question here answered is, what is the type of the modern so-called genus DRABA? In order to ascertain its type-species, one must consult always the original publication of a genus; and upon the matter of the authorship of the modern *Draba* we find contradiction between the most pretentious of recent taxonomic standards. In the *Synoptical Flora*, for example,

it is credited to Dillenius. In the *Illustrated Flora* it is attributed to Linnæus. Consulting Linnæus we find the authors of the last-named work in error, and those of the former correct. Linnæus neither proposed nor claimed as his the genus in question. He simply adopted it from Dillenius, and he distinctly credits it wholly to that celebrated cotemporary of his. To Dillenius, therefore, we are obliged to appeal, if we are to learn what is the type of the modern *Draba.* Consulting his pages in the *Nova Plantarum Genera,* published in 1819, we perceive that he established it upon four species, all taken out of the *Alyssum* of Tournefort; the essential generic character being found in the rosaceous or alsinaceous aspect of the corolla, each petal of which is bifid, so that the flower is not obviously cruciform as it is in *Alyssum,* but rather resembles that of a *Stellaria* or a *Cerastium.* Had this author gone no further, we should have been able to make out his type, or types, from Tournefort alone. But he saved posterity that labor, by enumerating four species as certainly of this genus, adding as doubtful a number 5.

I have not deemed it worth while to identify his fifth and doubtful *Draba.* I leave that to the advocates of the absurdest of all nomenclatorial subterfuges, the doctrine of "residues." The four which he enumerates as positive *Draba* species are, in modern binary nomenclature, these:

1. Erophila verna, DC.
2. Draba Caroliniana, Walt.
3. Petrocallis Pyrenæica, R. Br.
4. Berteroa incana, DC.

This represents the Dillenian succession and numbering of *Draba* species; and not only does *D. verna* stand first;

it is the type which he specifically discusses in his argument for the segregation of all these plants from the genus *Alyssum*. His argument is this: *Alsine* and *Spergula* are distinguished as genera by the bifid petals of the former and the entire ones of the latter. Therefore, he says, *Paronychia vulgaris* (*i. e.*, *Draba verna*) should be excluded from *Alyssum*.

The fact that *Erophila verna* is the type of Dillenio-Linnæan *Draba*—and the fact is simply incontrovertible—may interest such of our botanists as would like to accept the plant in the rank of a genus, but who shrink from adopting it under Adanson's ridiculous appellation of *Gansblum*; though there is no need of heeding that appellation since it is in violation of a higher law than that of priority, the law that botanical nomenclature must be Latin, at least in form.

4. *A Proposed New Genus* ABDRA.

This is a segregate from that, as it always seems to me, forced and empirical consociation of natural incoherents which passes with most people for a genus called *Draba*. It is apparently a monotype, and is known as *Draba brachycarpa*, Nutt.; a small annual, of rather wide dissemination southwestward and northwestward in the United States. It wears an aspect thoroughly unlike that of any other so-called *Draba*, more resembling, superficially at least, some possible *Capsella*, or *Thlaspi*, or *Hutchinsia*; and there is nothing but the form of its pods to suggest an alliance with the *Draba* aggregate, while from no section of the conventional *Draba* is it farther removed in its real nature than from that typified by *D. Caroliniana* with which authors have, I believe, invariably associated it in their books. Sir William Hooker, by the way, who was one of the first

botanists to see the plant, disposed of it as a proposed new species, not of *Draba*, but of *Alyssum*.

The suggestions of *Thlaspi* in this type lie in certain peculiarities of the foliage, which is of the same cut, the same pale hue, inclining to be purple underneath, and also in the fact that the sepals are thin and also purplish. But the pale hue of the *Thlaspi* herbage is owing to the presence of a more or less pronounced bloom, the plants being altogether glabrous, whereas in our plant the paleness is owing to a minute and peculiar appressed pubescence, in the characteristics of which it is most unlike that of any other so-called *Draba*. The whole genus is, by authors in general, credited with a stellate pubescence; but this is not very accurate; for a stellate pubescence properly consists of hairs that are both sessile and possessed of as many as five radiating branches. In most *Drabas*, at least the American species, the hairs are branched above the middle, or else not far below it, with branches most usually from two to five or more. Such a pubescence ought never to be described as stellate, but only as branched, or perhaps stellate-branched when the branches are numerous enough and sufficiently horizontal to form the conventional figure of a star.

In our plant, however, the pubescence is unlike that of any other so-called *Draba* in that while the hairs are closely sessile they consist of four rays and are exactly cruciform. There is probably no other cruciferous type which can be described as having a pubescence of sessile cruciform hairs.

Another remarkable characteristic of the present type is found in the existence, on almost all specimens not too old to show the foliage, of from two to four pairs of exactly opposite leaves at or near the base of the stem. I know of no other American crucifer that exhibits even in part an opposite phyllotaxy. The purple calyces and white or pinkish petals are not suggestive of *Draba*, but of certain other

genera already named. The pods are approximately those of some *Drabas* or of certain other siliculose genera. And on the whole, no longer content to call this thing a *Draba*, I propose to designate it as

ABDRA BRACHYCARPA. *Draba brachycarpa*, Nutt. in Torr. & Gray, Fl. i, 108.

NEGLECTED GENERIC TYPES.—II.

HALERPESTES.

The North American specific type, the study of which has brought me to the point of proposing a new genus under the name given above, is Pursh's *Ranunculus Cymbalaria*. The relation which the plants sustain to *Ranunculus* may well be compared to that subsisting between *Fragaria* and *Potentilla*. In *Halerpestes* and *Fragaria* the plants are what we call stemless, and propagation is secured by a system of long articulated runners which ultimately strike root and produce a new plant at each joint. The only fruit characters by which the group is distinguishable from *Ranunculus* are those of the thin texture and the striated surface of the achenes.

The type has, by several authors, been seen to be too strongly divergent from true *Ranunculus* to be retained within that genus; but the attempts to place it elsewhere seem to me to have been most irrational. The proposal to place it under *Oxygraphis* must surely have been made in great innocence of the real characteristics of that genus. *Oxygraphis* bears not the least resemblance to these plants. Its whole aspect is that of *Caltha*, from which its persistent sepals and one-seeded carpels distinguish it. And if the attempt to place it under *Cyrtorhyncha* is less objectionable

on the whole, it is only because the achenes are striated; but in habit, in texture of the achenes, and the important characters of the style, there is the widest divergence between them, while habitally they are totally different. My judgment is that either one of the propositions thus alluded to is worse than leaving the plants where they were under *Ranunculus.*

I think that the species of HALERPESTES are at least three; though the opinion that they are all geographical variations of one has its advocates.

H. SALSUGINOSA. *Ranunculus salsuginosus*, Pallas, Reise, iii. 213 (1778). An Asiatic plant, much smaller than the rest of the genus, with small entire or 3-dentate leaves and 1-flowered scapes.

H. CYMBALARIA. *Ranunculus Cymbalaria*, Pursh, Fl. ii. 392 (1814). *Oxygraphis Cymbalaria*, Prantl, (1891). *Cyrtorhyncha Cymbalaria*, Britton (1894). Very common in western North America throughout the mountainous and alkaline districts; the leaves subcordate-ovate and crenate all around the margin; scapes often 6 inches high and usually with several flowers; the heads of achenes oval or oblong.

H. TRIDENTATA. *Ranunculus tridentatus*, HBK. ex DC. Syst. i, 252 (1818). Plant of Mexico and southward, said to be distinguished from the last by 3-dentate leaves, and scapes mostly 1-flowered.

PERITOMA.

DC. Prodr. i, 237 (1824). *Atalanta*, Nutt. Gen. ii, 73 (1818), not of Correa (1805). *Cleome* species of more recent authors.

How clearly distinct from true *Cleome* our far-western allies of that genus are, was well enough shown by Nuttall in 1818; and the point was again emphasized by him in 1834. Meanwhile, in 1824 the elder De Candolle, certainly to be ranked as one of the great masters of botanical taxonomy, had adopted the genus heartily, at the same time assigning it a tenable name, in place of the original but homonymous *Atalanta* of Nuttall.

The characters of the genus are so numerous that I can only excuse those of our botanists who have ignored it, on the ground of the paucity of our capparids on the whole, together with the fact that the *Peritomas*, occupying their own distinct section of our territory, are never seen growing along side the *Cleomes*, and so their differences, even of general habit and aspect, have not drawn the attention of those without field experience both southward where *Cleome* occurs, and far-westward in the region of *Peritoma*.

The most obvious character of *Peritoma* as compared with the older genus is its synsepalous calyx. Equally striking, and also even more notably characteristic, are its sessile petals; those of *Cleome* being long-unguiculate. And again, while in *Cleome* the four petals on their long slender stalks are turned to one side, so as to stand in a row (as in *Gaura* when compared with *Œnothera*), those of *Peritoma* radiate as from the center, as sessile petals in such flowers are almost obliged to radiate. So that, on the whole, even the corollas of these two genera differ, those of each from those of the other, with the difference which distinguishes regular and irregular corollas. The name *Peritoma* itself, however, calls attention to the strong character of the calyx, which, consisting of a tube and teeth or segments, is deciduous by a sort of circumscission of the tube near its base.

The species of this genus are not numerous, and are named as follows:

P. SERRULATUM, DC. Prodr. i, 237. *Cleome serrulata,* Pursh, Fl. ii, 441. *Atalanta serrulata,* Nutt. Gen. ii, 73. A common large and showy species, of the Rocky Mountain plains and foothills originally, but of late years extending its range eastward to Illinois and Wisconsin.

P. INORNATUM. *Cleome inornata,* Greene, Pitt. iv, 16. A small species of southwestern Colorado, at present little known.

P. AUREUM, Nutt. Journ. Philad. Acad. vii, 15. From the plains of the Platte to those of Lewis River, according to Nuttall. The species has not been recognized latterly, nor do I know it, yet have I more faith in Nuttall's knowledge and judgment of western plants than I have in those who suppress his species. Many have confused this with the next.

P. LUTEUM, Raf. Sylv. Tellur. 112. *Cleome lutea,* Hook. Fl. i, 70, t. 25. Of wide dissemination on alkaline desert plains beyond the Rocky Mountains.

CELOME.

In the *Cleome platycarpa* of Torrey we are furnished with another decidedly good if not strongly characterized generic type. Here we have a calyx at the opposite extreme from that of the synsepalous genus *Peritoma*; for its sepals are not only distinct, but almost filiform, and widely spreading from their very base. The corolla, however, is as far from that of *Cleome* as can well be. The petals, though spatulate, are not the least inclined to one side, but are radiant as in *Peritoma,* though apparently more spreading. The fruit is altogether peculiar among those of our capparids in that it is very broad and flat, presenting the seeds in two perfectly

distinct rows. The filaments are excessively elongated and tortuous; and the torus of the flower is glandless; that in all other *Cleome* allies exhibiting one or more large nectary-like glands.

The genus must be considered monotypic.

C. PLATYCARPA. *Cleome platycarpa,* Torr. Bot. Wilkes Exped. 235, t. 2.

CARSONIA.

I assign this name to the most remarkably distinct of all those diverse types that have been negligently referred to *Cleome*; the desert plant which Mr. Watson named *C. sparsifolia.* It is totally a thing apart from all near allies of *Cleome* even as to its inflorescence; for, instead of being gathered into long and dense racemes, the flowers are largely solitary, that is, scattered all over the bushy plant, one in a place at the end of each short leafy branchlet; though the main branches bear at their ends from three to a half-dozen loosely collected in what may be called a short raceme or subumbellate cluster. The calyx is chorisepalous, though in a way most unlike what is seen in either *Cleome* or *Celome*; for the sepals are broad and short, and do not at all spread away from the petals. The petals have the posture of those of *Peritoma,* not of *Cleome,* but they have a distinct 2-lobed nectariferous scale at base, nothing like which is otherwise known among our capparids. The stamens in this type are also exceedingly characteristic, being short, stiff and straight, the whole stamens scarcely equalling the petals in length, whereas in all allied genera the filaments are slender, and so elongated as to be protruded far beyond the petals. Not many genera in this or any other choripetalous alliance are established upon so many and such strong characters.

C. SPARSIFOLIA. *Cleome sparsifolia,* Wats. Bot. King Exp., 32, t. 5.

ALDENELLA.

The type here proposed is also of the *Capparideæ,* but belongs not to the West, but to the sandy shores of the Gulf of Mexico. It is the *Cleome tenuifolia* of Le Conte, referred to *Polanisia* by later authorities. It is equally out of place in either genus. It has neither the corolla of *Cleome* nor the fruit of *Polanisia.* The pod of the last named is indehiscent except at apex, where the ends of the valves separate and curve outward to emit the seeds, the valves being actually persistent. In ALDENELLA the valves are, in the first place, marked by a peculiar and very notable reticulation; but they are promptly deciduous quite as in *Cleome* and its nearer allies. But in *Polanisia* the petals are unguiculate and stand in a line quite as in *Cleome,* whereas in our proposed new genus they do not, but radiate around the central axis; but the corolla here is remarkably irregular, two of the petals being of thrice the size of the other two; and all of them in shape are unlike those of either genus to which the species has been referred.

A. TENUIFOLIA. *Polanisia tenuifolia,* Torr. & Gray, Fl. i, 123. *Cleome tenuifolia,* Le Conte, l. c.

SOME ROCKY MOUNTAIN ASTERS.

It will be seen that the Aster species described in this paper are largely of my own collecting during the last decade in various sections of Colorado and Nevada, most of them having come from special localities not visited by other botanists; or at least visited by none who have given

particular attention to this genus. But the several species attributed to Wyoming are based on material assiduously collected by Professor Nelson, and submitted to me for study.

The Asters of those far-western regions are doubtless not as numerous as the eastern representives of the genus, yet their number will prove considerable, and perhaps as difficult of definition as the eastern.

I believe that all, or nearly all, the following will be found valid species; and it is likely to be long before several of them will be better known; for I have obtained them in places not easily accessible; but they are excellently represented in my herbarium.

A. DISTICHOPHYLLUS. Low, with many erect leafy and usually monocephalous stems rising separately from a system of branching horizontal rootstocks: leaves from oblong-lanceolate to spatulate-linear, thickly clothing the simple stem and diminishing in size upward, all of firm texture, pale and glaucesent, also on both faces sparsely and stiffly strigose, the entire margins scaberulous, the lower and subpetiolate ones with half-clasping base: stem commonly reddish and with an appressed whitish pubescence: head hemispherical, $\frac{1}{2}$ inch high and $\frac{3}{4}$ inch broad: involucre comparatively small, its firm erect bracts in about 3 not very unequal series, the outer spatulate-oblong, obtuse, herbaceous, the inner more linear, acute, and with narrow green tips, all more or less ciliolate: rays 40 or more, purplish.

On clayey banks below Marshall Pass, southern Colorado, 4 Sept., 1896, collected only by the writer. A peculiar dwarf monocephalous very leafy species, with the numerous leaves often appearing in two ranks by a sort of polarity. The tallest specimens are hardly six inches high.

A. VIOLACEUS. With the subterranean vegetative system

of the last, the much taller and more slender less leafy stems strongly decumbent, usually a foot high or more, the herbage of a brighter green, the stems red-purple: lowest leaves very narrowly oblanceolate, 4 or 5 inches long including the petiole, the cauline half as long, linear, incurved, and with a fascicle of small ones in their axils, all of firm texture, quite entire sparsely strigulose and the margins rough with a short incurved ciliation: heads solitary, or more commonly 3 to 5 and corymbose, nearly ½ inch high, almost hemispherical: involucre of about 3 series of unequal and distinctly imbricated bracts all with purple herbaceous erect tips, the outer obtuse, all pubescent externally and more or less ciliolate: rays violet.

Dry ground at base of Little Ouray Mountain east of Marshall Pass, Colorado, 4 Sept., 1896; collected by the writer. An elegant species, with involucre red-purple as in some *Machæranthera* species; but a most genuine *Aster*.

A. ARMERIÆFOLIUS. Stems several, less than a foot high, subscapiform and corymbose from a branching crown bearing tufts of so-called radical leaves; these erect 3 to 5 inches long, oblanceolate, petiolate, entire, acute, deep green and glabrous, reticulate-venulose, the few and scattered cauline spatulate-linear, sessile, all scabrous-ciliolate: pedunculiform purple stems glabrous except for traces of the usual pubescent-lines: heads rarely solitary, commonly 3 to 10, nearly ½ inch high, involucres almost hemispherical, their spatulate-linear bracts in about 3 series, all herbaceous almost throughout, obtuse, the outer very distinctly though finely ciliate at least to above the middle, all traversed from base to apex by a fine but distinct mid-nerve; rays 40 or more, violet: achenes moderately compressed, with 4 or 5 unequally distributed but very obvious angles, the sides

sparsely pubescent; pappus whitish, fragile and deciduous.

Borders of marshy meadows below Marshall Pass, Colorado, 4 Sept., 1896.

A. PRATINCOLA. Stems arising, as in the last, from a crown bearing many leaves, but not subscapiform, rather freely branching and fastigiately panicled, often 2 feet high: lowest leaves upright, 5 to 7 inches long, oblong-lanceolate to narrowly oblanceolate, entire, obtuse or acutish, rather firm, somewhat 3-nerved but not venulose, glabrous except as to the scabrous margin; the cauline much reduced, all sessile: involucres $\frac{1}{3}$ inch high, campanulate, their bracts in 3 or 4 series, well imbricated, none wholly herbaceous, all with oblong green tips and more or less ciliate: rays 25 to 35, purple: achenes with an appressed pubescence and 5 very prominent ribs of unequal distribution; pappus sordid, rather deciduous.

A fine and conspicuous species of meadow lands along the Gunnison River at Gunnison, Colorado, 1 Sept., 1896, collected by the writer.

A. MAJUSCULUS. Erect, stout, 1 to 2 feet high, with abundant large foliage and few large heads either somewhat freely panicled or subracemose: leaves of sterile basal shoots oval to spatulate-oblong, 2 to 4 inches long, scarcely petiolate, ascending or depressed, the copious cauline ones similarly large, often even larger, more spatulate, amplexicaul, commonly with fascicles of smaller ones in their axils, all from nearly entire to notably crenate, rarely crenate-serrate, of moderately firm texture, deep green and glabrous on both faces, even the margins hardly scabrous; ascending pedicels or floral branches often with small spreading bracts and the whole inflorescence rather amply leafy: the few or rather

numerous heads ½ inch high; bracts of the campanulate involucres in 3 series, none herbaceous, spatulate, with cartilaginous base and erect acute green tips: rays about 30, broad and showy, flesh-color or purplish.

A luxuriantly leafy species with large heads, both heads and foliage in some way recalling *A. frondeus*, though as to both the habit and inflorescence as well as the bracts, thoroughly distinct from that and all others known. It was obtained by myself in September, 1896, among the wooded mountain summits above Cimarron, Colorado, where it adorns open and rather moist places among the woods and thickets.

A. ADSURGENS. Stems low, forming loose but somewhat extensive masses through a system of branching rhizomes, the longest stems seldom a foot long, decumbent, or merely assurgent, loosely racemose or racemose-panicled above the middle: stem and branches notably pubescent, the foliage scarcely at all so: leaves of short sterile basal shoots crowded, oblanceolate, with dilated and partly sheathing base, very entire, acute, 2 to 4 inches long, 1-nerved or less distinctly 3-nerved; those of the flowering branches linear, often somewhat falcate-curved, the margins scabrous: heads campanulate, ⅓ inch high; bracts of involucre imbricated in about 4 series, the few outer ones herbaceous, oblong, obtuse, the others chartaceous in the main and white, but with erect, acute green tips: rays 25 to 30, rather short, white or with a more or less deep violet tinge.

Common in open grass lands along dry runs among the foothills about Cimarron, Colorado, 30 Aug., 1896, collected by myself. The species, notwithstanding its low stature and depressed habit, with loose inflorescence and large heads, is strictly an ally of *A. multiflorus*, especially of its

far-western homologue, *A. commutatus*, Gray, though the bracts in our plant are in no wise spreading.

A. SPITHAMÆUS. Stems several, 5 to 8 inches high, from horizontal rootstocks, erect, rigid, rather densely leafy up to the fastigiate-corymbose inflorescence of 3 to 7 above middle-sized heads, both stems and foliage firm and even rigid; all the leaves oblanceolate, acute, entire, sharply scabrous-ciliate, the petiolar base hispid-ciliate, the upper surface strigose-scabrous, the lower glabrous: involucres campanulate, ⅓ inch high, their bracts strongly imbricated in about 4 series, mainly cartilaginous and colorless except as to the elliptic green tips, all acute, sparsely strigose on the back and marginally ciliolate: rays 20 or more, deep purple; central flowers of the head sterile, achenes of the several fertile series red-purple, compressed but rather prominently 5-angled, the whole surface with a sparse appressed white pubescence.

A fine species, known only in specimens collected by myself on a dry mountain side above Gunnison, Colorado, 10 Sept., 1890. I at the time mistook it for a *Machæranthera*, misled by its rigid leafiness, much imbricated involucre and rich purple rays; but it is a very genuine *Aster*.

A. FULCRATUS. Stems low, slender, decumbent, numerous, from a loose but extensive system of slender horizontal rootstocks and partly subterranean stolons, the leaves terminating the latter small and from obovate to spatulate oblong; those of the red-purple, white-puberulent proper stems linear and lance-linear, 2 to 4 inches long, 1-nerved, all entire and glabrous: heads large, solitary at the ends of the smaller stems, few and racemose or subcorymbose on the taller ones, but these only a foot high: involucres turbinate

but broadly so, their bracts few and little imbricated, almost wholly herbaceous, the outer from ½ to 1 inch long, linear, entire, acute, wholly glabrous as are also the short spatulate-linear ones: rays 15 to 20, ¾ inch long, of a rich rose-purple or paler and roseate-lilac: achenes not known: pappus light-colored.

Rocky ravines in the mountains of southern Colorado near Pagosa Peak, at 9,000 feet, C. F. Baker, 12 Aug., 1899. A most beautiful and very distinct new *Aster*, rather allied to such eastern species as *A. paniculatus* and *Novi-Belgii*, the western group of which *A. adscendens* is typical. The outer involucral bracts often surpass the rays.

A. GLASTIFOLIUS. Stems a foot high or more, closely and amply leafy up to the terminal and somewhat dichotomously cymose inflorescence; herbage pale-green and glaucous, nearly glabrous, some lines of white pubescence marking the stem, the leaf-margins scabrous, the lower face of the foliage sometimes very sparingly so: lowest leaves broadly oblanceolate, the others spatulate-lanceolate, all entire, acute, 2 to 5 inches long, sessile by a broad clasping base: pedicels of the 5 to 12 heads subtended by conspicuous oblong-linear leafy bracts: involucres broadly campanulate, nearly ½ inch high, their bracts in 2 or 3 series but subequal, especially in the terminal head, where they are almost wholly herbaceous, lance-linear, acute and more or less ciliolate, those of the lateral heads more imbricated and with more evident colorless margin toward the base, all strictly erect: rays 20 to 30, long and showy, purple.

Known to me from but two stations, both in Wyoming, namely, Prof. A. Nelson's n. 3,555, from North Vermillion Creek, 17 July, 1897, and one from Pass Creek, in the Big Horn Mountains, 16 July, 1890. A very satisfactory species

remarkable for its leafiness, and the peculiarly almost dichotomous open cyme of heads.

A. Nelsonii. Stems slender, wiry, about 2 feet high from branching and only superficially seated subligneous rootstocks, simple, leafy throughout and racemosely or subcorymbosely floriferous above the middle: cauline leaves (the basal not seen) about 3 inches long, firm, narrowly linear, entire, acute, sessile and half-clasping, 1-nerved, glabrous on both faces, the margin scabrellous: involucres broadly turbinate, 3 lines high, their bracts imbricated in about 3 series, the short outermost often wholly herbaceous, oblong and obtuse, the others successively narrower and lanceolate or linear, acute, pubescent on the back and marginally ciliate, mostly well differentiated into lanceolate green tip and marginally colorless linear base: rays about 20, violet or paler, rather narrow and inconspicuous.

The type specimens are in my herbarium from Fishers' Ranch, Albany County, Wyoming, and were collected by A. Nelson, 13 Sept., 1898, and the label bears the number 5,326. The same collector's n. 6,868, from the Laramie Hills, Sept., 1899, seems to be a larger and less simple state of the same, though with rather more numerous and broader involucral bracts. Again, his n. 1,758, from Centennial Valley, is nearly typical; only rather more amply leafy.

A. lætevirens. Stems very erect, 1 to 2 feet high, glabrous except as marked by lines of pubescence decurrent from the leaves, commonly red or purple, otherwise pale and glaucescent, leafy, and somewhat equably so, even to the narrow and fastigiate or broader and subcorymbose panicle: leaves lanceolate, or oblong-lanceolate, sessile by a broad and almost auriculate-clasping base, thinnish, light-

green or glaucescent, entire or obscurely and remotely serrate toothed, marked by a white midvein and some fine less obvious reticulation: involucres turbinate or subcampanulate, their bracts narrowly lance-linear, very acute, the narrow light-green herbaceous tips pervaded by a fine but distinct white midnerve, the margins remotely serrulate-ciliolate: rays many, usually long and showy, pinkish to rose-purplish.

This is a rather neat and attractive lowland meadow *Aster* probably common in Wyoming and adjacent Colorado along streams in mountain parks. My specimens are nearly all from Mr. A. Nelson; and I give his numbers in the order of the excellence of their character as types. No. 5,293, from Hutton's Lake, Albany County, 1898; n. 6,870, from Laramie, Sept., 1899; n. 1,151, from Laramie City Park, 30 Sept., 1894; n. 964, from the Gros Ventres River, 23 Aug., 1894; n. 1,118, from "East Fork," 25 Aug., 1894. I have also one fairly typical specimen from along the Platte in North Park, Colorado, 10 Sept., 1899, collected by Mr. Osterhout; but on the sheet are two other specimens which I should not refer here. Another by Blankinship, from Pass Creek, Big Horn Mountains, Wyoming, may be the same, though its involucre is very foliaceous, the outer bracts as long as the inner.

A. PROXIMUS. With vegetative characteristics of the last, but of a deeper green, the foliage more ampliate and spreading, all the leaves quite entire; inflorescence more truly paniculate and open: involucres campanulate, the outer bracts wholly herbaceous and spreading, the green tips of even the innermost also spreading, all cuspidately acute: rays 35 or more, large and showy, flesh-color to rose-purple.

Represented with me by Mr. Nelson's n. 6,788, from Madison River, Yellowstone Park, and n. 2,478, from Pass Creek, Wyoming. Necessarily separated from *A. lætevirens,* to which it is next of kin, on account of its loose panicled inflorescence and thinner greener involucral bracts with recurved tips.

A. EXSUL. With the red stems and light-green glaucescent herbage of *A. lætevirens*, but stouter and low, less than a foot high; leaves larger in proportion, of a thick, firm texture and veinless, spatulate-lanceolate, sessile by a cordate-clasping base, sharply scabrous-serrulate, otherwise glabrous: inflorescence racemose-panicled, but short and rather dense: involucres small, their firm erect bracts almost linear, acute, with narrow pale-green tips: rays about 25, bluish.

On stream banks of the Humboldt River meadows at Deeth, Nevada, 5 August, 1895, collected by myself only.

A. VALLICOLA. Slender, erect, 1 to 2½ feet high, simple up to the lax corymbose or corymbose-paniculate inflorescence; only the pedicels of the few heads and their bracts hoary-puberulent, the main stem and few branches glabrous: leaves mostly subradical, lanceolate or oblanceolate, only 3 or 4 inches long including the slender hirsute-ciliate petiole, glabrous, the entire or faintly serrate-toothed margins delicately scaberulous; cauline leaves few, reduced and sessile, varying from lance-linear to linear, but always with a widened and half-clasping base: involucres small, almost hemispherical, their linear-lanceolate bracts in about 3 series, almost wholly green-herbaceous and not very unequal, their narrow whitish margins below obscurely ciliolate or quite naked; rays 35 to 40, pale purplish.

Abundant in moist meadows of Pine Valley, above Palisade, Nevada, collected by the writer, 25 July, 1896.

A. LIMONIIFOLIUS. Near the last, equally slender and with a similar corymbose-panicled inflorescence, but the stem much more equably leafy, the lowest leaves broadly oblanceolate, obtuse, entire, the blade scarcely 2 inches long, the petiole much longer and strongly hirsute-ciliate, those of the middle and upper portions of the stem successively oblanceolate and spatulate-lanceolate, mucronately acute, all the foliage pale green or glaucescent, indistinctly veined, perfectly entire, glabrous except the rather sharply ciliolate-scabrous margins: peduncles of the small heads appressed-pubescent: involucres small, campanulate, their bracts imbricated in about 3 notably unequal series, only the short outer series herbaceous, the others with herbaceous tips, all acute and distinctly ciliolate all around: rays 30 or more, rather narrow and short, flesh-color.

Habitat of the last, and collected at the same time.

A. LIMOSUS. Stems very erect from a horizontal rootstock, green and glabrous at base, otherwise marked with pubescent lines, especially the branching portion, commonly a yard high, leafy throughout and paniculate above the middle: lower leaves with linear-lanceolate serrate blade and a narrowed petiolar base, the whole 4 to 7 inches long, the upper linear and sessile, serrate or entire, all glabrous on both faces but the margin serrulate-scabrous: heads in a rather narrow and strict more or less corymbose panicle: involucres campanulate, about 4 lines high, their bracts in 2 or 3 subequal series, all linear or spatulate-linear, the outer often wholly herbaceous, acute, scarcely ciliate, though with some minute ascending hairs along the margin: rays about 30, rather narrow, rather pale violet.

Collected only by the writer, near Palisade, Nevada, 24 Aug., 1896. It is an inhabitant wet reedy margins of

stagnant ponds and pools along the Humboldt River; a tall but not showy species, with few and remote, though excessively elongated cauline leaves, the subterranean parts lying just below the surface of the clayey mud.

A. OXYLEPIS. Erect rigid stems, several from the root, simple up to the racemose or somewhat panicled inflorescence, commonly 2 feet high, sparsely and minutely scabrous below, the upper portion more notably and somewhat strigosely pubescent: lower leaves narrowly oblanceolate, 3 inches long, entire, acutish; the upper linear, the bracts of the pedicels subulate-linear, all scaberulous at least marginally: involucres 3 or 4 lines high, broadly turbinate or somewhat campanulate, their bracts distinctly imbricated in about 4 series, the short outer ones mostly herbaceous, the others with obovate green tips ending in a sharp setaceous point, all ciliate except the innermost, these being linear and with a more central herbaceous line: rays 15 to 20, broad and rather short, pale-violet.

On dry and rather sandy banks and terraces along the Humboldt River, below Palisade, Nevada, 24 Aug., 1896, collected by the writer. Species suggestive of the Californian *A. Menziesii* by its narrow and racemose inflorescence, yet not intimately related to it, nor very obviously to any other. The setaceous-pointed involucral bracts recall the *Machærantheras*; but the plant is otherwise far from forming even a connecting link between that genus and the Asters.

To the foregoing species of the Rocky Mountains and regions adjacent, I append the following one peculiar to southern California.

A. ENSATUS. Tall, very leafy, rather closely panicled

above, the numerous short-pedicellate heads rather large: stem glabrous below, the branches of the inflorescence coarsely pubescent in lines: leaves linear-lanceolate, acute, of firm texture, slightly curved, the lowest 3 or 4 inches long, evenly and sharply serrate, those of the branches and branchlets perfectly entire, very closely stiffly and sharply setose-ciliolate: campanulate involucres $\frac{1}{3}$ inch high, their linear bracts in 2 or 3 series but nearly equal, the outer sometimes wholly herbaceous, the inner with dark-green tip and midnerve: rays about 30, pale-purplish or flesh-color.

Meadows about San Bernardino, California, S. B. Parish, n. 3,818. Confused with his *A. hesperius*, by Asa Gray, but very distinct from that Rocky Mountain type by its rigid sword-shaped and sharply edged leaves, the lowest of which are sharply serrate. It is a Pacific Coast homologue of the eastern *A. paniculatus.*

Corrections in Nomenclature.—III.

The name *Oreastrum*, employed by me on pages 146 and 147 of the third volume of this series to designate a genus, I find to have been practically preoccupied; for it can not be maintained as different from the *Oriastrum* of Poeppig & Endlicher. I therefore propose Oreostemma as a convenient substitute for my former and untenable *Oreastrum*; the species to be named thus:

O. alpigenum. *Aster alpigenus*, Gray.

O. Haydeni. *Aster Haydeni*, Porter. *A. pulchellus*, D. C., Eaton.

O. Andersonii. *Aster Andersonii*, Gray.

O. elatum. *Oreastrum elatum*, Greene.

An equally unfortunate attempt to establish a substitute for the homonymous *Greggia* of Asa Gray, was made by me five years ago. The PARRASIA (Eryth. v. 75) then proposed was discovered to be a homonym soon after the appearance of the third volume of the *Index Kewensis*, and I have too long delayed the correction. For this latest *Greggia* I now offer the name NERISYRENIA. The species are:

N. CAMPORUM. *Greggia camporum*, Gray.
N. LINEARIFOLIA. *Greggia linearifolia*, Wats.

The generic name *Grayia*, as now long employed in American botany, dates from 1841 only; while another genus by the same name was published a year or two earlier. Our salsolaceous shrubs of the far-western deserts need, therefore, a name that shall not be revertible, and I offer for this purpose the new name EREMOSEMIUM. The species are two only:

E. SPINOSUM. *Chenopodium (?) spinosum*, Hook., Fl. ii, 127, or *Grayia polygaloides*, H. & A. Bot. Buch. 387.

E. BRANDEGEI. *Grayia Brandegei*, Gray, Proc. Am. Acad. xi, 101.

GEUM AUCKLANDICUM may replace *G. sericeum*, Kirk, Students, Flora of New Zealand, 129, (1899) which is a homonym by reason of my own North American *G. sericeum*, Pitt. iii, 172 (1897).

TRELEASEA PUMILA. *Zebrina (?) pumila*, Greene, Pitt. i, 157. This plant, which I, twelve years since, was strongly inclined to make the type of a new genus, certainly falls into Mr. Rose's genus *Treleasea* newly established. It may even be identical with one or the other of the two species recognized by Mr. Rose. But my specimen is not now to be found, unless at the University of California.

Senecio densus. *S. compactus*, Rydb. in Mem. Torr. Club. v. 342, long antedated by the *S. compactus* of Kirk in Trans. New Zealand Inst., xii. 395 (1879).

Hieracium Traillii. *H. Greenii*, Britton, Bull. Torr. Club, xx. 120. The eastern *H. Greenii* is by years more recent than the Californian *H. Greenei*, Gray. Dr. Britton probably knew all this; but I think no other botanist will be found of the opinion that *Greenii* and *Greenei* are different names.

Abronia ammophila. *A. arenaria*, Rydb. Fl. Montana, 137 (1900), a name precluded by *A. arenaria*, Menzies.

Vol. IV. Part 24.

PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE,

Professor of Botany in the Catholic University of America,

Washington, D. C.

January, 1901.

CONTENTS:

	PAGE
Taraxacum in North America,	227
New or Noteworthy Species—XXVIII,	233
Studies in the Compositæ—VIII,	242
1. Type of the Bidentideæ,	242
2. Sketch of the History of Bidens,	243
3. Identity of Bidens frondosa, Linn.,	246
4. Sketch of the History of Bidens cernua, Linn.,	251
5. American Analogues of Bidens cernua, Linn.,	252
6. Segregates of Bidens chrysanthemoides, Michx.,	262
7. Generic Rank for Bidens Beckii, Torr.,	270
8. Some New Eupatoriaceæ,	272
9. Certain Species of Antennaria,	280

Price, Fifty Cents.

Payot, Upham & Co., *San Francisco*: William Wesley & Son, *London.*

Taraxacum in North America.

The Dandelions of our vast and varied regions have hitherto received but little attention from botanists. In Gray's *Synoptical Flora* North America is credited with *T. officinale*, the most common of Old World species and the type of the genus, in five varieties, only one of which was supposed by that author to be peculiar to North America.

At present *T. officinale* typical is well known to have become naturalized in almost all, even the newly settled portions of our country, while it is a fact more recently recognized, that another fine and well marked Old World species, *T. erythrospermum*, is thoroughly established all along the Atlantic slope from eastern Canada to Virginia.

Indigenous species will probably be found sufficiently numerous, though perhaps only upon western mountain territory; but the herbarium material is at present poor, on the whole, and insufficient for anything more than a tentative elucidation of the genus. Many sheets of specimens exhibit no fruit at all, but only leaves and flowers; and while the outer or calyculate involucre seems to present the best array of constant characters for species, the fruit is always necessary.

In my own more recent peregrinations on *Taraxacum* territory, I have been careful—as every collector of these plants should always be—to obtain the perfectly ripe achenes; and some of the most indisputable of the species here proposed are based on this complete material of my own collecting.

It is greatly to be wished that certain northeast American forms, Nova Scotian, Labradorian, and from the Hudson's

Bay district, several of which are in the Canadian Survey collection in flower only, might be obtained in fruit. At present I dare not attempt a classification of the incomplete, though by no means scanty, material from those parts, as it exists in the great Canadian Herbarium referred to.

From the far northwest the specimens are all more mature, and therefore more successfully dealt with; and from the number of new species which I am already able to define from not only the northern, but the middle Rocky Mountain regions, it seems that this long stretch of elevated country is the center of distribution for *Taraxacum* as indigenous to our continent.

T. CHAMISSONIS. Glabrous throughout, or the scapes tomentose or villous under the involucre: leaves large, of obovate-oblong or broadly oblanceolate outline, obtuse, or mucronately or cuspidately acute, and from lightly runcinate-toothed to more deeply cut into triangular usually entire or sometimes saliently dentate lobes: scapes few, stout, erect, sometimes more than a foot long: involucres of a very dark green, the outer set of bracts in about 3 series, erect and imbricated, from broadly and deltoidly ovate to ovate-lanceolate, commonly abruptly apiculate, rarely some of the inner developing a horn; inner linear-lanceolate not rarely corniculate: achenes of a rather greenish brown, spinulose about the summit, the 3 or 4 angles smooth below the summit, the intervening ribs more or less distinctly low-tuberculate; the beak twice or thrice the length of the achene.

This is the most common *Taraxacum* of Alaskan and Bering Sea shores and islands. Its most constant peculiarity is that of a very dark-colored, almost blackish, involucre, of which the outer scales are very broad, strictly erect and imbricated.

✓ T. RUPESTRE. Small and slender, the scapes 4 to 6 inches high and surpassing the rather narrow foliage; herbage glabrous: leaves narrowly oblanceolate in general outline, acute, from saliently runcinate-toothed to runcinate-pinnatifid: rather narrow involucres, dark green as in the last, but of very few bracts, those of the calyculate set scarcely biserial, ovate, erect, of the inner lance-linear, the innermost with broad scarious margin below, some of them more or less plainly corniculate at tip: achenes of notably cuneiform outline and truncate at the prickly summit, the ribs below somewhat distinctly toothed or serrated; stipe of pappus a trifle longer than the achene.

An exclusively British Columbian mountain species, as far as known, the best type, Mr. Macoun's n. 15,111, from an altitude 6,000 feet on Mt. Queest, where it was found occupying the crevices of rocks. His n. 15,110 from Kicking Horse Lake is quite the same; and also other excellent specimens by him were taken at an altitude of 8,000 feet on Mt. Avalanche of the Selkirk Mountains. Distinct from *A. Chamissonis* by its very simple involucre and short pappus-stipe, as it is from the next by its dark involucre and slender habit.

✓ T. OVINUM. Dwarf, apparently alpine or subalpine, with large deep root and small leaves and scapes, the latter only 2 or 3 inches long and barely equalling the leaves, tomentose under the involucre, the whole plant otherwise glabrous: leaves oblanceolate, obtuse, occasionally quite entire, or at least only obscurely denticulate, more usually quite plainly runcinate-toothed or even coarsely so: bracts of involucre few and all remarkably broad, those of the outer and calyculate double series ovate, with scarious margins and an abrupt short truncate apiculation, those of the inner series alternately lance-linear and ovate-lanceolate, these broader ones

(the very inmost set) ovate at base by virtue of a broad scarious margin, this usually concealed by the alternating exterior narrower and marginless bract: achenes muricate at summit, tuberculate along the ribs, the beak or stipe of the pappus short, of less than twice the length of the achene.

On Sheep Mountain, Waterton Lake, Alberta, July, 1895, collected by Mr. John Macoun, n. 11,711. Very distinct from all other alpine species, and approaching European types in the shortness of the stipe of the pappus.

✓T. LACERUM. Rather slender, the scapes erect, 4 to 6 inches high at flowering, and even then notably surpassing the foliage; scapes flocculent, all other parts glabrous: leaves 2 to 4 inches long, consisting of a linear rachis-like body and a few pairs of divaricate or retrorse subulate-linear or falcate lobes; outer bracts of involucre biserial, lanceolate, with dilated tips, erect, the longest three-fourths as long as the inner, these also dilated and corniculate: achenes sharply spinulose at the very apex, the sides smooth, striate or ribbed; stipe of pappus only twice the length of the achene.

Cañon of the Upper Liard, in lat. 60°, north of British Columbia, collected by Mr. Dawson, 26 June, 1887, and numbered 15,119 in the Geol. Surv. Herb. This is all the material seen by me of what is a new species of very peculiar aspect, and pronounced characters of leaf and involucre.

✓T. DUMETORUM. Large, the crown of the root, or each of its several branches, bearing mostly one stout erect scape a foot high or more, and several upright leaves, some more than a foot long; herbage glabrous, except some traces of arachnoid hairiness along the midvein beneath in young and growing

foliage: leaves oblanceolate, often very broadly so, acutish, the margin not deeply but very unevenly and laciniately cut, the teeth spreading, seldom at all runcinate: scape under the involucre arachnoid-tomentose: outer bracts in about three series, very large, pale and thin, before the flowering almost equalling the inner and nearly concealing them, under the mature fruit relatively shorter, oblong, lanceolate, narrowed toward the summit, then again dilated into an ovate tip; inner bracts narrowly linear-lanceolate, with a dilated and bifid tip: achenes distinctly compressed, olive-green, spinulose at summit, otherwise smooth, or the two prominent angles and intervening ribs variously tuberculate or somewhat muricate; beak thrice the length of the achene.

Common in the northern Rocky Mountain districts from Wyoming to British America, either in open thickets or by streams along their borders, or sometimes in open but moist meadow lands.

The most typical specimens are those of my own collecting along Dale Creek, Wyoming, July, 1896. Essentially the same, though much larger plants, are two sheets in the Canadian Survey, both collected by Mr. John Macoun, namely, n. 12,737, from Moose Jaw, Assiniboia, and n. 5,087, from the Cypress Hills, N. W. T. I should also refer here Rydberg & Bessey's n. 5,295 (as it is in my set), from the Bridger Mts., Montana, distributed for *T. latilobum*, DC., though it is not at all typical, its leaves being too deeply and evenly lobed, its scapes not erect, its outer involucral bracts too small, and its inner ones less distinctly corniculate. But a plant from Highwood Mts., Montana, by R. S. Williams (n. 434 of my set) is again quite typical *T. dumetorum*, though in his *Flora of Montana* Mr. Rydberg has catalogued it as *T. ceratophorum*. But judging from the original and very

full description by Ledebour, of that Old World type, this Rocky Mountain plant makes no manner of approach to that.

T. MUTILUM. Foliage and involucres nearly or quite glabrous, the scapes arachnoid-villous: leaves narrow, simply and deeply runcinate-pinnatifid, the lobes narrow and acute: scapes many, erect from the very base; outer involucral bracts lanceolate and oblong-lanceolate, narrowed above, thence widening to a triangular cleft tip; inner ones lanceolate, but with a long linear tip, this occasionally bicorniculate, but more commonly with one of the two horns obsolete: achenes muricate at summit, the angles below somewhat serrate or tuberculate; the beak barely twice the length of the achene.

Johnson River, Alaska, 27 June, 1899, Capt. E. F. Glenn; the type specimens in the herbarium of the Missouri Botanic Garden.

T. ANGUSTIFOLIUM. Glabrous throughout; crown of the root usually much branched and the leaves and scapes numerous: leaves depressed, of oblong-linear outline, 4 to 6 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide, obtuse or mucronately acute, from sharply and remotely denticulate to coarsely dentate, the teeth all simple, opposite, seldom runcinate: scapes rather slender, slightly decumbent, in maturity twice the length of the leaves: involucres rather narrow and few-flowered, their outer bracts few and small, in a single series, or at least scarcely biserial, broadly lanceolate to oblong, erect: achenes chestnut-brown, spinulose-muricate at summit, smooth and obtusely costate from above the middle to the base; beak about thrice the length of the achene.

Open subalpine meadows along Dale Creek, Wyoming, 1 July, 1896, collected only by the writer.

T. AMMOPHILUM. A. Nelson in Herb. Stoutish, but multicipitous and depressed, the leaves and numerous decumbent scapes only 2 or 3 inches long; herbage wholly glabrous: leaves oblong, or spatulate-oblong, acutish, evenly but not strongly runcinate-toothed: outer involucral bracts in a single and even scanty series, thin and pale, oval to ovate-lanceolate, erect; the inner narrowly lanceolate, their tips slightly and somewhat scariously dilated: achenes distinctly though not strongly compressed, of a dark red-brown, muricate at the acute summit, the four principal angles tuberculate below, the intervening ones similar except as being less prominent; stipe of pappus nearly thrice the length of the achenes.

Collected in the moist grassy valleys of Sand Creek, Wyoming, in good flower and fruit, 31 May, 1900, by Prof. Nelson, and distributed by him under n. 6,987. The species is an excellent one, and differs from all other American forms known to me in its dark-red achenes; a point of seeming contact with the Old World *T. erythrospermum*, which, now naturalized on the Atlantic coast, is otherwise of very different character.

New or Noteworthy Species.—XXVIII.

THALICTRUM FISSUM. Two feet high, slender but rigid, leafy up to the rather narrow panicle; herbage altogether puberulent and glandular-dotted even to the flowers and achenes, except the mostly glabrous and glandless upper face of the leaflets; these of somewhat triangular outline, often deeply 3-parted and the divisions trifid, or some almost subpinnately cleft into 5 to 7 obtuse or acutish segments: sepals not seen: achenes straight, of nearly elliptic

outline, scarcely compressed, very saliently 8 to 10-ribbed and deeply channeled between the ribs, the persistent style and stigma little curved, rather short, barely (or scarcely) one-third the length of the achene.

Type from Stein's Mountain, Oregon, at the head of Wild Horse Creek, by W. C. Cusick, 14 July, 1898; but a sheet of specimens from near Colby, Butte Co., California, by Mrs. Austin, 1896, appears to be the same. Species with peculiarly and beautifully cut foliage; an ally of *T. Fendleri*, though with very different achenes.

Rumex ellipticus. Allied to *R. altissimus*, not as tall, the elliptic foliage more elongated, the panicle more ample, all the verticils crowded; pedicels jointed at the very base: valves of the fruiting calyx larger, of more rounded outline (from round-ovate to round-deltoid) and obtuse, none grain-bearing, all reticulate-venulose, the veins becoming obsolete toward the thin margin.

In fields and along river banks at Roswell, New Mexico, 5 August, 1900, F. S. Earle. The real *R. altissimus* has always one valve with a large full grain, one with a rudimentary grain, and the third with no trace of a grain.

Rumex hesperius. Allied to *R. altissimus*, but low and slender, very leafy, the panicle small, small-fruited: leaves elliptic-lanceolate, very acute or acuminate, wavy-margined or even almost crisped: pedicels jointed at the very base: valves of the fruiting calyx from quite exactly and sharply deltoid to subreniform-deltoid, as broad at base as long, none grain-bearing, all distinctly though not strongly venulose, seldom obviously reticulate.

Bottom lands near Bingen, Washington, 31 Oct., 1893, W. N. Suksdorf; the specimens distributed for *R. altissimus*, but the species very distinct.

CHEIRANTHUS BAKERI is offered as a substitute name for *C. aridus* of page 198 preceding, the latter being precluded by *C. aridus*, A. Nelson, Bull. Torr. Club, xxvi. 351.

LAPPULA INFELIX. Low, slender, simple or with a few loosely racemose often tortuous branches, the leaves and leafy bracts of the raceme pilose, no rosette of radical leaves produced: all four nutlets alike, more or less deeply cupulate, the cup surmounted by 6 or 8 larger aculeæ and some smaller ones intervening; ventral portion of nutlet outside the cup muricate, the back plane smooth, or with a few tubercles forming a more or less distinct ridge up and down the middle.

Collected on the Malheur River, eastern Oregon, 20 June, 1898, by Mr. Cusick, and distributed for *L. occidentalis*, some specimens of which are mixed with the new one in the distribution; on which account the label number (1,945) is useless, and not to be cited as certainly representing *L. infelix*.

ALLOCARYA ORTHOCARPA. Low and small, but stoutish and somewhat succulent, only 3 or 4 inches high, simple or with one or more ascending branches from the base, glabrous: leaves elongated and linear: spikes strict: calyx-segments linear, erect, more than twice the length of the nutlets; these fixed by the base, erect and straight, of broadly lanceolate form, transversely rugose, or the rugæ disposed to run together and form meshes, the intervening spaces finely tuberculate.

Cache Valley, Utah, 17 June, 1898, Miss Mulford. Species closely allied to *A. stipitata* and *A. stricta* of California, but with good characters.

ALLOCARYA COGNATA. Very slender and reclining, not

succulent, notably strigose-pubescent, especially the inflorescence; lower leaves long and ligulate: racemes loose, the fruiting calyces spreading, on short and slender pedicels: nutlets minute, broadly ovate, more or less abruptly acuminate, strongly and irregularly wrinkled on the back, in no degree tuberculate, the insertion lateral just above the base.

By the same collector and from the same locality with the preceding, both having been sent me by Miss Mulford on one sheet under the same number (147). This one is an ally of *A. Californica* and *A. scopulorum.*

✓ Solidago aureola. Stems erect, a foot high or more, sparingly leafy below, the upper one-half with an interrupted or continuous narrowly thyrsiform more or less leafy-bracted inflorescence; herbage green and glabrous, only the inflorescence sparingly scabrous-puberulent; lowest leaves from spatulate-obovate to oblanceolate, and from lightly crenate to subserrate, the cauline lanceolate, acute, entire, all of comparatively thin texture: bracts of the middle-sized and rather short involucre in about 3 series, from ovate-oblong to oblong and spatulate-oblong, all obtuse, carinate-nerved, and with thickened green-herbaceous tips; corollas of both disk and ray golden-yellow: achenes (immature) appressed-pubescent; pappus fine, barbellate-scabrous.

El Capitan Mountains, southern New Mexico, at about 8,000 feet, in the pine belt, 28 July, 1900, F. S. Earle. A southern homologue of *S. decumbens*, Greene; differing by its thin foliage, narrow and dense elongated inflorescence, and golden-yellow rather than light-yellow flowers.

✓ Coleosanthus modestus. Stems rigid and subligneous, perhaps suffrutescent, a foot high or more, leafy up to the

short cymose panicle of nodding heads: leaves mostly alternate deltoid-subcordate, 1 to 2 inches long, short-petioled, evenly crenate-serrate, of firm texture, somewhat scabrellous-puberulent on both faces, the somewhat prominent veins as also the stem densely and more or less glandular-puberulent or pubescent: involucres about 4 lines high, subcampanulate; bracts from ovate-oblong and acute to oblong and obtuse, scarious-margined about the summit, strongly 3-nerved: achenes with about 10 scabrellous angles, but these unequally prominent and unevenly distributed, some closely approximate in pairs or threes, others rather widely separated.

Gray's Peak, Lincoln Co., New Mexico, at 6,500 feet, F. S. Earle, 25 July, 1900. A species to be compared with *C. ambigens*, Greene, and *C. Fendleri*, Gray; this last now referred to *Eupatorium*.

✓ Coleosanthus nepetæfolius. More herbaceous and less rigid than the last, also taller, quite as leafy, the leaves twice as large, thin, subcordate, acuminate, crenate-serrate, on slender petioles an inch long, variously alternate or opposite or in imperfect whorls of three: stem, petioles and veins of leaves hirsute-pubescent and viscid-glandular: heads in a rather ample leafy panicle: involucres erect, 3 or 4 lines high, short-cylindric; bracts from ovate, acute, to oblong, obtuse, the innermost linear, all more or less hirsute-ciliate; achenes either quite uniformly 10-ribbed or the alternate ribs less prominent.

Salado Cañon, near Gray, New Mexico, 2 Sept., 1900. A species perhaps akin to *C. floribundus* rather than near the last.

✓ Coleosanthus gracilipes. Herbaceous perennial near *C. grandiflorus*, but less leafy and with much larger slender-

peduncled somewhat drooping heads: leaves subcordate-deltoid, 2 inches long, serrate-toothed except at the slender and attenuate apical acumination, the petioles less than ½ inch long: terminal cymose panicle rather naked, the heads solitary or in pairs on elongated slender peduncles and mostly drooping, fully ¾ inch long, the outer ovate bracts caudate-acuminate, the inner very numerous, thin, lance-linear, acute: achenes slender, subclavate, the ribs setulose-pubescent; pappus deciduous.

Common in the middle Sierra Nevada, California; well represented in Bolander's n. 5,030, from Clark's Ranch. The true *C. grandiflorus* seems to occur in northern California, and its type from still farther north differs greatly from *C. gracilipes* in having large often subhastate-ovate 3-nerved and doubly serrate leaves, together with far more numerous much smaller short-peduncled and erect heads. Its achenes are short, quite cylindric, and much more setulose.

✓ COLEOSANTHUS POPULIFOLIUS. Herbaceous and allied to *C. grandiflorus*, but the thin long-petioled leaves broadly deltoid, abruptly acuminate, exactly crenate though coarsely so, minutely glandular-dotted especially beneath, but glabrous, the stem puberulent: heads in subumbellate clusters of 3 to 7 terminating leafy and subcorymbose branches: involucres subcampanulate, less than ½ inch high, the thinnish bracts oblong-ovate and oblong-lanceolate all acutish, 4-nerved, ciliolate: achenes cylindric, pubescent; pappus deciduous (as in all near allies of *C. grandiflorus*).

Eagle Rock, Barry Co., Missouri, 21 Sept., 1896, B. F. Bush, the specimens distributed for *C. grandiflorus*, from which its deltoid and crenate foliage completely distinguishes it.

✓ COLEOSANTHUS UMBELLATUS. Akin to *C. grandiflorus*,

equally herbaceous but more rigid and brittle, widely branching above, scabrous-puberulent throughout: leaves twice the length of their petioles, 2 to 4 inches long, from subcordate-deltoid and long-acuminate to triangular-lanceolate, coarsely crenate-dentate except at the subtruncate base and the acumination, of firm texture, beneath scabrous-pubescent along the veins and minutely resinous-glandular between them, the upper face wholly scabrellous and without glands or resin-dots: heads fully ½ inch high, in umbellate or subumbellate clusters of 5 to 10 terminating the long and somewhat naked rigid ascending branches: bracts of the involucre thin, all acutish, 5-nerved, scarious-margined, very lightly ciliolate: achenes rather slender, cylindric, setulose along the sharp ribs.

Rather common in the mountain districts of northern Arizona; and well marked by its notably subumbellate inflorescence, firm texture, rough pubescence, etc.

COREOPSIS ANGUSTATA. Perennial, erect, 2 feet high or more, very slender, with a terminal corymbose panicle of few and long-peduncled heads: whole plant glabrous: leaves few, opposite, long-petioled, and with one or two pairs of elongated and remote almost filiform entire segments: outer involucre much reduced, of a few ovate or deltoid-ovate spreading bracts; inner of about 8 large ovate-lanceolate ones: rays as many, large and showy, golden-yellow, cuneate-obovate, 3-lobed above the middle, the terminal lobe much larger than the two lateral ones: outline of achenes including the wings (these as broad as the body) quadrate-orbicular; pappus a pair of erect naked bristles of about one-third the length of the achene, this and its wings as a whole distinctly incurved.

Dry pine barrens at Palma Sola, Florida, 16 May, 1900, S. M. Tracy. My label bears the number 6,921.

✓PARTHENIUM STRAMONIUM. Shrub 5 to 12 feet high, stout, much branched: leaves ovate-lanceolate, subcordate, acute, from almost entire to repand-dentate, green and only slightly velvety above, the lower face and the petioles white with a fine and close tomentum: coryrmbose panicle rather dense and many-flowered, its peduncle and pedicels slender, the whole nodding in age.

No. 393 of Townsend & Barbers' Chihuahua collection of 1899; also Hartman's No. 248 from Sonora, this distributed as *P. tomentosum*, which is a plant with much broader and coriaceous foliage which is coarsely dentate, and on the lower face reticulate-rugose. Its panicle is also stout-peduncled and upright. In our plant the leaves in form, venation, and arrangement strongly suggest those of some species of *Datura*.

PICRADENIA DAVIDSONII. Biennial, erect, mostly less than a foot high, somewhat fastigiately branching, the naked peduncles 7 to 15, and 2 to 4 inches long, these and the branches striate, hardly at all pubescent: leaves pinnately cut into 3 to 7 filiform segments (the basal ones, *i. e.*, those of the first year, not known): heads of middle size for the genus; involucres broadly campanulate, their ovate-lanceolate outer bracts with notably thickened and indurated base, the inner ones longer, thinner, broadly ovate, pubescent: achenes densely silky; paleæ of the pappus ovate, slenderly acuminate but not aristate.

Clifton, Arizona, June, 1900, Dr. A. Davidson.

✓ZYGADENUS LONGUS. Slender, scarcely glaucescent, 2 feet high or more, the few and very broadly linear thin leaves almost as long as the loosely racemose scape, marked by about 11 prominent parallel nerves and as many faint

intervening lines and marginally faintly scabrous-denticulate: slender pedicels about 1 to 1½ inches long, their lanceolate and somewhat green-herbaceous bracts not half as long, perianth-segments with round-ovate obtuse limb and broad very short claw, the whole greenish-white except as to the white margin.

Banks of streams in the mountains of eastern Oregon, at an altitude of 4,000 to 7,000 feet, collected by W. C. Cusick, and distributed (n. 2,060 with me) as *Z. elegans*, though of wholly different aspect, and with remarkably broad as well as elongated and thin foliage of a rather bright green rather than glaucescent hue.

* ZYGADENUS GRACILENTUS. Slender, scarcely glaucescent, a foot high or more, the leaves long, oblanceolate-linear, abruptly callous-pointed, marked by about 5 to 7 prominent nerves, the intervening lines 2 or 3 between each pair: raceme narrow, 10 to 15-flowered, the slender suberect pedicels ½ to ¾ inch long, their bracts about half as long, subulate-lanceolate, scarious: segments of the greenish perianth spatulate-oblong in the pistillate plant, broader and very obtuse or commonly retuse in the staminate, only the inner 3 at all unguiculate, the gland small and not well defined.

Slopes of the Sierra Madre, Chihuahua, Mexico, 1 Oct., 1887, C. G. Pringle (n. 1383 in my set), labelled *Z. elegans*, but of a perfectly distinct species, with oblanceolate foliage, the plants strictly dioicous as far as seen.

Studies in the Compositæ.—VIII.

1. *Type of the Bidentideæ.*

By the term Bidentideæ I would designate a certain group of plants, to my mind a very natural one, of which the genus *Bidens* is typical. It embraces such other genera as *Coreopsis, Cosmos, Thelesperma, Heterosperma* and *Dahlia*; all these and as many more genera very closely allied, are admitted by the conservative Bentham as valid, and made to constitute his subtribe Coreopsideæ of the Helianthoideæ. I see no marks of real affinity between any of these plants and the true *Helianthus* allies. By the remarkable characteristics of their double involucre, as well as in important matters of floral structure, they stand entirely aloof, as it seems to me, from all helianthoids. That certain of the latter, *Actinomeris* and *Verbesina* for example, have flattened and two-armed achenes, no more necessarily connects the Bidentideæ to the Helienthoideæ than the same conformation and crowning of the achenes of *Boltonia* connects either of the aforenamed to the Asteroideæ. Such empirical taxonomy was in its prime a century and a half ago, when both *Actinomeris* and *Verbesina* were included in *Bidens*, as the asteraceous *Boltonia* also might have been, if that type had then been known.

The Bidentideæ are a group so exceedingly natural that one of Mr. Bentham's most worthy contemporaries proposed to merge the whole group in one genus *Bidens*; a proposition which, as I shall presently show, is fully as logical as that of Mr. Bentham, who himself admits severl genera for which, according to his criteria, no characters exist.

With me the Bidentideæ—or Coreopsideæ, if one prefer the more usual name—consitute a distinct tribe or subfamily of the Compositæ.

Apparently the earliest plant of this tick-seed and dahlia alliance to be honored with a mention by any botanical author was that homely weed of Europe now known as *Bidens tripartita.* And while as yet plants were grouped together according to habitat, or uses, or according to resemblances in foliage, this type was always associated with another aquatic herb of similarly three-parted opposite leaves, namely *Eupatorium cannabinum*, or the genus *Cannabina* as it was called by some. But as early as the year 1583 Cæsalpinus proposed to separate this aquatic tick-seed from the genus *Eupatorium* and to make it the type of a new genus which he denominated BIDENS. This is the origin of *Bidens* as a generic proposition; as a genus established upon habit, along with certain characters of flower and fruit; and the type of the genus and of the subfamily is *B. tripartita.*

2. *Sketch of the History of* BIDENS.

During somewhat more than a half-century after Cæsalpinus this humble type which he had placed in separate generic rank under the name of *Bidens* was still, by all the multitude of botanists and botanical compilers, retained under *Eupatorium* as before. Then, toward the end of the seventeenth century, it began to be felt that this was an odd type to be associated with *Eupatorium cannabinum*, and its nearer relation to *Chrysanthemum* was suggested; after which suggestion a considerable number of authors treated it, and also some of its congeners then newly brought from America, as species of *Chrysanthemum.*

PITTONIA, Vol. IV. Pages 243–284. Issued 26 Jan., 1901.

The worthiness of Cæsalpinus to be ranked among the most illustrious of botanists is best attested by the fact that he published a beautiful book—setting forth new principles, and full of new deductions—which the botanical world was not ready to adopt until a hundred years afterwards; and his new genera had to wait from the year 1583 until 1694 before meeting with acceptance.

Tournefort's *Elemens*, though scarcely more than an enlarged and illustrated edition of Cæsalpinus' modestly-entitled volume *De Plantis* of a hundred and eleven years before, converted the world almost at once to the true principles of plant classification, and, in its second edition, *Institutiones Rei Herbariæ*, became the one great landmark in the history of botanical science. There has never been another book to equal it in its influence for the advancement of systematic botany; nor does it seem possible that its equal as an epoch making treatise can arise in the future.

In both the *Elemens* and the *Institutiones* of Tournefort *Bidens* of Cæsalpinus is given its place. The number of species included in it by this author is thirteen. Two of them are Cæsalpinus' original ones. Five are transferred hither from other nominal genera, and six are proposed as new. But the *Bidens* of Tournefort embraces a number of species not naturally of this genus; the type species, for example, of *Verbesina* and of *Actinomeris*, both being technically at agreement with *Bidens* as to the external characters of a flattened achene and a biaristate pappus.

Vaillant, in 1720, revising the genus under the new and needless name of *Ceratocephalus*, excludes the *Actinomeris* and *Verbesina*, and still has twenty species, among which we recognize a part of the material upon which *Coreopsis* was afterwards to be established.

Dillenius, a dozen years later, restored the name *Bidens*

to the group, and added to it under that name not only some new species now known as belonging to *Coreopsis*, but also the types of *Melanthera*, which latter plants, it seems strange to say, were not excluded from *Bidens* until as late as the year 1803, by Richard, the author of Michauxs' *Flora*.

In 1737 Linnæus proposed a new genus *Coreopsis*, monotypical with him, then, and represented by the *Bidens succisæfolia* of Dillenius, now called *Coreopsis lanceolata*.

When, however, in 1753 Linnæus came to the distributing of the species, he practically abandoned the original idea of *Coreopsis*, and could only maintain the genus by relegating to it all the so-called *Bidens* species having more or less conspicuous ray-flowers, retaining in *Bidens* those to which he had attributed discoid, or rayless, heads. In thus cutting the knot, he was undaunted by the fact that by drawing the line at the presence of ray-flowers, he was obliged to place *Bidens cernua* half in *Bidens*, the other half in *Coreopsis*, where the radiate state of the species is made to figure as *Coreopsis Bidens*.

Before the end of the eighteenth century there were two proposals made to divide *Bidens*, one by Necker in 1790, and another by Moench in 1794. Necker retains the typical *Bidens*, *i. e.*, the type having simple or tripartite leaves, flattened achenes and a two- to four-awned pappus, assigning it the new, and certainly more appropriate, name of *Pluridens*, while for the group having a more dissected foliage, tetragonal achenes, and an almost always four-awned pappus, he proposes the generic name *Edwarsia*. Moench's idea was the same; but he left the old type under the name of *Bidens* and designated the new genus as *Kernera*. At about the same time, and upon a type scarcely different from that of *Edwarsia* and *Kernera* Cavanilles established *Cosmos*; and this last has been accepted everywhere, while

the equally good and perhaps too nearly equivalent *Edwarsia* has been as universally ignored.

To the consideration of this point in the history of the classification of the group I shall return later.

3. *Identity of* BIDENS FRONDOSA, Linn.

Introductorily to the discussion of this question must be given a sketch of the all important pre-Linnæan bibliography of the species.

B. FRONDOSA, Linn.

[1]*Eupatorium Canadense, flore luteo,* H. R. Par. (1661).

Chrysanthemum cannabinum Americanum, Moris. H. R. Bles. (1635).

C. cannabinum bidens Americanum caule erecto firmo subrubente, Moris. Hist. iii. 17 (1699).

Bidens Canadensis latifolia flore luteo, Tourn. Elem. 367 (1694), also Inst. 462 (1700).

Ceratocephalus tripteris et pentapteris folio, flore luteo discoide, Americanus, Vaill. Mem. Acad. 327 (1720).

In the flora of North America, the nearest approach to *B. tripartita,* the type-species of the genus, is made in this familiar *B. frondosa.* Equally with its Old World homologue does our plant typify the Candollean section or subgenus *Platycarpæa,* of which the most salient characteristics are the flattened and more or less obovate achenes, never either contracted or dilated at summit, and merely two-edged and two-awned. But this *B. frondosa,* at least as to the definition given it by authors in general during almost the whole of the nineteenth century, is an aggregate of at

---

[1]Neither the anonymous folio, *Hortus Regius Parisiensis,* nor Morison's *Hortus Regius Blesensis* has been seen by me, and the citations are here taken upon the authority of Tournefort.

least two very distinct species. The most important segregate from it was proposed by myself in July, 1899, under the name of *B. vulgata*; while a few weeks later, Mr. Wiegand of Cornell University, having attempted the same segregation, gave out a good description of the true *B. frondosa* under the new name of *B. melanocarpa*, at the same time characterizing as *B. frondosa* what is almost if not precisely my new *B. vulgata*. The writer says: [1]"Considerable difficulty has been experienced in deciding whether Linnæus' plant was of this species or the preceding." And when Linnæus' account of the plant is referred to as being "the original description" we appreciate the difficulty; and from that initial point we judge it to be altogether insuperable. From that brief diagnosis which Linnæus constructed, there would be no deciding which of several species he had in view; and so we may be glad that it is not "the original description." But the earlier descriptions, to which his bibliography of the species gives a clew, may help us to a conclusion. Let us examine some of them. And the examination may illustrate some of the difficulties, not, however, insuperable, incident to a full interpretation of Linnæus and pre-Linnæan authors.

From that earliest appellation, "Eupatorium Canadense, flore luteo" of the *Hortus Regius Parisiensis* not much light seems likely, at first thought, to be gained as to what *Bidens frondosa* ought to be. It carries us back to the time when the three or four species of the genus known were all considered as Eupatoriums; allies of *E. cannabinum*. Why was this one designated as yellow-flowered? It was always placed next to *B. tripartita*, as nearly related to that; yet *B. tripartita*, though its minute disk-corollas are yellowish, was never, either as *Eupatorium* or as *Bidens*,

---

[1] Bull. Torr. Club, xxvi, 409.

described as *flore luteo.* It is a fact, after all, very seriously to be considered, that when the predestined *B. frondosa* first appeared in European botanic gardens, and while as yet no other plant but the native *B. tripartita* was there with which to compare it, the American one was described as yellow-flowered, while the native one had never been so designated. Of course, the Bidens "flower," with not only the earlier authors, but with Linnæus as well, was the head, including the double involucre, the outer member of which was called the calyx. Now *B. melanocarpa* of Mr. Wiegand is admitted to exhibit yellow rays, and those quite copiously at earliest flowering; and I have often observed that all through its flowering period, even when rayless, the bracts of the inner involucre almost glow with a coppery or brownish yellow. But *B. tripartita* is rayless, and its involucres are said to be of a dark, reddish brown. It would not, therefore, have been described as *flore luteo.* No more would my *B. vulgata* have been so designated, for its involucres are green, it has no rays, and even its disk-corollas are only "pale-yellow," as Mr. Wiegand himself says, in describing it as "*B. frondosa.*"

Again: it was owing to the yellow coloring of the heads—yellowish as to involucre, yellow as to small rays and deep-yellow disk—that the predestined *B. frondosa* was early transferred to *Chrysanthemum*, a fate which did not befall the rayless *B. tripartita* until much later, and after it had been realized that all of them, radiate or rayless, belonged in the same genus, and natural conservatism prevented either the establishment of a new genus or the restoring of the then long forgotten *Bidens.*

It is in Morison's *Plantarum Historia Oxoniensis* that one meets with the earliest full and satisfactory descriptions of species of *Bidens.* They are still so few—only five in all—

that in describing them he gives a very full diagnosis of the type-species, and then compares with it, in very few words, those nearest to it. They are all, with him, species of *Chrysanthemum.* The description of *B. tripartita* occupies twelve lines across a wide folio page. This is a type, even among groups of so-called *Chrysanthemum.* Next to it he places the American species in question, only briefly indicating the points wherein it differs from the others. It is said to be both taller and stouter, the stems more red. Its achenes, according to him, differ from those of the other only in being larger. He has, however, described those of *B. tripartita* as being black; therefore by the surest of inferences in the predestined *B. frondosa* he found them black; just the character which suggested the name for Mr. Wiegand's *B. melanocarpa.* It can not be believed, by one who has read this page by Morison, that if the plant then cultivated in Old World botanic gardens had had the olive-green or even yellowish-green achenes of my *B. vulgata*, (*B. frondosa*, Wiegand), this most discriminating student of plants would have failed to set this down as one of the characters by which it may be distinguished from *B. tripartita,* the "seeds" of which he says are black.

Again: no mention is made by Morison or any other early or late author of any disparity between *B. tripartita,* and *B. frondosa* as to the size of the heads. They are therefore to be concluded as quite alike, or at least approximately so, in the two, as regards size; and actually there is no appreciable average difference of size between the heads of *B. tripartita* and *B. melanocarpa*; and so we have a third strong character for establishing identity between the original *B. frondosa* and *B. melanocarpa*; for in *B. vulgata* they are constantly of twice or thrice the size of those of the other two.

One of the marks of *B. vulgata,* as I indicated in the

diagnosis, is its fastigiate branching, by virtue of which the full-grown plant is more or less approximately flat-topped, none of the branches being horizontally directed, but all strongly ascending. And I have not sought in vain for a mention of the mode of branching of *B. frondosa* by early writers. Philip Miller, in the year 1759, speaks of the plant familiarly, after having grown it for many years, as "sending out many horizontal branches;" another most decided testimony in favor of the freely and widely branching *B. melanocarpa* as being the true *B. frondosa.*

So then, the *B. frondosa* of Linnæus, according to the testimony of a long line of descriptive witnesses, had the following four clear marks of identity with what has now been called a new *B. melanocarpa*: (1) Its branching was horizontal; (2) Its heads were radiate, and otherwise so yellow in appearance that it was early called a *Chrysanthemum*; (3) Its heads were not notably larger than, nor different in form from, those of *B. tripartita*; (4) Its achenes were black, or nearly so. In none of these points is my *B. vulgata* at agreement with this actual *B. frondosa* of seventeenth and eighteenth century authors; therefore it must be that real segregate, which was so long awaiting recognition.

As to Mr. Wiegand's variety, which I may designate as *B. vulgata* var. *puberula*, I have seen and collected it more than once, as often wondering if it might not prove specifically distinct, but have not yet found characters to warrant the proposition. I can not but suspect, from the comparative scarcity of *B. vulgata* at the East, that it came originally from the prairie States, and is not indigenous with us here. Its habitat in the vicinity of Washington is cultivated ground almost or quite exclusively, which is far from being the case with true *B. frondosa.*

4. *Sketch of the History of* Bidens cernua, Linn.

This is, typically at least, an Old World species; but it is commonly credited with a very extensive distribution in North America, where it has hitherto been uniformly accredited as indigenous. That anything properly referable to *B. cernua* is native on our Continent I shall by and by call in question. But let me first give some of the older bibliography of the species.

B. cernua, Linn.

Bidens folio non dissecto, Cæsalp. De Plantis, 488, (1583).

Eupatorium cannabinum chrysanthemum, Tabern. Ic. 117 (1590).

Cannabinæ aquaticæ similis capitulis nutantibus, C. Baub. Prodr. 138 (1620).

Cannabina acquatica folio non diviso, C. Bauh. Pinax, 321 (1623).

Bidens folio non dissecto, Tourn. Elem. 367 (1694) and Inst. 462 (1700).

Eupatorium cannabinum chrysanthemum, Barrelier, Ic. 1209 (1714).

Ceratocephalus persicæ foliis, flore luteo radiato, Vaill. Mem. Acad. 326 (1720).

Bidens foliis longe ellipticis, serratis, indivisis, Haller, Helv. 710 (1742).

The above is a mere selection of the more important references to this plant by authors from Cæsalpinus down to the time when Linnæus named it *Bidens cernua*, a period of about one hundred and seventy years. It was not until some time after Linnæus that any record was made of the occurrence of this species, or any cernuous *Bidens* at all, in America. In so far as I can ascertain, Willdenow, in 1803,

makes the first mention of "*B. cernua*" as inhabiting North America as well as Europe. His account of the species in general concludes with the note that it is native to Europe and North America. Then in a subsequent note, namely, under the exclusively American species, *B. chrysanthemoides*, he says: "*Bidens cernua*, with its varieties, I also have from North America." Pursh a few years later confirms *B. cernua* as common in our country; and since then all our authors have accepted it. Before proceeding to discuss the question of our having *B. cernua* in America, I wish to call attention to certain marked peculiarities of this particular type of *Bidens*.

Habitally these species diverge from the most genuine *Bidens* in that they are lower in stature, stouter and inclined to be succulent, as well as very leafy with undivided often connate leaves. Their ray-flowers when present are twice as numerous as in the typical group; and their achenes are often four-angled and four-awned, as well as of a much more strictly cuneiform outline, being widest, and even very emphatically so, just at the summit, thence tapering to the base. Such characters of flower and fruit would warrant the recognition of a genus if the habital peculiarity of the group were as constant. But almost the same habit recurs in *B. connata* and its allies, which are of proper and genuine *Bidens* as to their achenes. In view of these so nearly perfect connecting links between the two groups, I should not venture to propose *B. cernua* as the type of a genus.

5. *American Analogues of* Bidens cernua, Linn.

After careful and repeated comparisons made between European and American specimens of so-called *B. cernua*, I acknowledge inability to detect any strong technical characters upon which to separate them. Nevertheless they are

so different in aspect, even as seen in the herbarium, that I can no longer doubt that they are altogether distinct. This difference is so pronounced, even upon the face of dry material, that I imagine any botanist familiar with ours, on being introduced to the Old World plant alive and fresh, would be forced to admit that he had never before seen *B. cernua.* I shall not attempt an analysis here, of the several marks which combine to give its characteristic *facies* to the Old World plant; but any competent botanist who may care to investigate the case, may do this for himself, if he have access to an herbarium in which both are represented.

In studying our North American cernuous forms, I have become aware of the presence of characters not before observed or mentioned, but upon which it is necessary to propose new species. One of these is marked by singularly long and narrow ray-corollas. Others exhibit such characters of achene and awns as it is impossible not to interpret as of specific import; for example, the achenes in one are black and smooth, in another brown or greenish and strongly striate. While in some the achene is compressed and with only two of the angles prominent and retrorse-barbed. in others it is more evenly four-angled and with all the angles barbed. Again, the angles are suberous-thickened in some, in others not at all so; and the awns themselves, as to their relative, and also as to their absolute proportions, their texture and their color, are very different in plants of different habit and diverse geographical range.

The varieties proposed by Mr. Wiegand are such aggregates of true species, some of them most excellent, that I am obliged to decline attempting to perpetuate the varietal name in either case. And this I can do with the best of good conscience since I have always denied that there is any obligation to elevate varietal names to specific rank when the varieties themselves are thus promoted.

✓ B. ELEGANS. Stems a foot high, slender, sparingly branched from above the middle, terete, glabrous, red-purple: leaves narrowly lanceolate, about 3 inches long and with seldom more than 3 pairs of teeth, these short but salient: heads of middle size, strongly cernuous on slender and notably elongated peduncles: outer bracts of involucre greatly reduced, not as long as the inner, spreading or deflexed: rays 6 to 8, narrowly oblong-linear, of thrice the length of the involucral bracts and golden-yellow, 10-nerved: disk-corollas with slender tube, short unceolate throat and long teeth or segments, the latter erect: achenes of the outer series 4-angled and -awned, of the inners 3-awned, the angles not cartilaginous-thickened, retrorsely aculeate like the awns, the surface greenish brown and rather coarsely striate.

Known to me only as collected near Northwest, Norfolk Co., Va., 8 Nov., 1898, by Mr. T. H. Kearney, whose specimens are in the U. S. Herbarium. The species is beautifully marked by its singularly long golden-yellow rather narrow rays. The habit, the foliage, and the achenes are all characteristic.

✓ B. LUGENS. Two feet high, slender, freely loosely and and widely branching, the scabrous stem and branches green and striate: narrowly lanceolate leaves 3 to 5 inches long, widely spreading, lightly and not very closely serrate-toothed: heads slender-peduncled and nodding: bracts of outer involucre spatulate, serrulate, exceeding those of the inner series but hardly equalling the 7 to 10 large and broad bright-yellow rays: disk-corollas with long tube and much shorter limb, the latter much surpassed by the tube of long blackish anthers: achenes blackish, narrowly obovate-cuneiform, marginless, all but the outermost merely

2-edged and -awned, the awns with soft and slender retrose aculeæ, the edges of the achene below them similarly retrorse-ciliate.

This is a strikingly handsome and rather large species, probably common in such marshes of Maryland and Virginia as skirt the estuaries of the Potomac River. The type specimens were collected by Mr. Theo. Holm and myself back of Marshall Hall, Md., 28 Sept., 1898. We both remarked at the time that this was quite a new aspect of *B. cernua*, as exhibiting a dark-brown disk, this being due to the long-protruded anther-tubes, in allusion to which peculiarity, as accompanying cernuous heads, I have assigned the specific name. The rays are about twice as large as in those more northerly plants that exhibit nodding heads.

B. GRACILENTA. Slender, simple, 1 to 2 feet high, rather closely corymbose at summit; the stems purplish, scabrous, terete, not striate: leaves narrowly lanceolate, 2 or 3 inches long, about equalling the internodes, lightly and rather remotely serrate: bracts of outer involucre small and reflexed, not as long as those of the broad inner set, these and the chaff of the receptacle more than usually yellow and petaloid: disk-corollas with long tube and short campanulate limb: achenes of very distinctly cuneiform outline, short, black and shining, compressed-trigonous and -tetragonous, none of the angles corky or cartilaginous, but the two principal ones when viewed from the side appearing obtusely somewhat repand-toothed, each hair or bristle of such margin arising from a tubercular elevation; awns 3 or 4, very stout and rigid, not very unequal, the longest more than half as long as the achene.

Near Minneapolis, Minnesota, 23 Sept., 1891, Sandberg, n. 985. A species very well marked in habit, as well as in

the beautiful characters of the achene. Few if any American species are so much like *B. cernua* in mode of growth; yet it is perhaps one of the last which I should think of referring to that, in view of the difference in the achenes.

✓B. CILIOLATA. Stoutish, erect, simple, a foot high, corymbosely oligocephalous at summit, the terete stem glabrous: leaves divaricately spreading, 3 inches long, narrowly lanceolate, acuminate, subpetiolate, rather closely and saliently serrate except along the linear liguliform petiolar base, this, as also the whole margin between the serratures, scabrous-ciliolate: heads large, hemispherical, terminating naked and rather short peduncles; bracts of outer involucre narrow, reflexed, not much longer than the inner: rays none: disk-corollas with short tube and shorter subcampanulate limb, the whole surpassed by four subequal stout and strongly aculeolate dark-brown awns, these more than half as long as the little compressed strongly 4-angled (but not corky-angled) dark-brown achene.

This species, exceedingly well marked both as to foliage and fruit, I have seen only in the U. S. Herbarium. The specimens were collected by A. H. Crozier at Grand Rapids, Michigan, 1 Sept., 1886.

✓ B. PRIONOPHYLLA. Rather slender, a foot high or more, branching from the base, scabrous-pubescent: leaves from almost linear to narrowly linear-lanceolate and elliptic-lanceolate, rather deeply and sharply serrate, 2½ to 4 inches long, sessile but scarcely connate: heads on long and slender naked or bibracteate peduncles, hemispherical; bracts of outer involucre spreading, small, seldom surpassing the rays; these numerous, 10 to 15, rather short, light-yellow: disk-corollas short, the tube and short subcylindric limb

nearly equal: achenes narrowly obovate-cuneiform, greenish, strongly striate, the angles elevated but not corky, sparsely awned with yellow aculeolæ; pappus-awns 3 or 4, yellow and stout-prickly, not very unequal, the longest half as long as the achene.

This is another boreal plant, and one with foliage somewhat like that of true *B. cernua,* though much narrower, and the habit is quite different. The most typical specimens are the Canadian Survey n. 12,055, from the River Moira, Ontario, Macoun, 14 Sept., 1877, and n. 12,049, from Muskeg Island, Lake Winnipeg, 11 Aug., 1884. Also 12,052, of Drummond's collecting in the "Rocky Mountains" (Drummond's n. 625) seems the same.

B. HYPERBOREA. Erect, slender, simple and monocephalous, only 4 to 7 inches high and with 3 or 4 pairs of leaves these in general oblanceolate, nearly or quite entire: terminal head on a slender peduncle about as long as the subtending pair of leaves, campanulate; outer bracts oblong, rather few, not widely spreading, surpassing the head: inner series yellow marked with many dark lines: rays none; chaff of receptacle remarkably large and petaloid, obtuse, surpassing the disk-corollas and even the awns of the achene; the achene itself narrowly linear-cuneiform, brownish, strongly striate, not suberous-margined, the two pairs of awns notably unequal, the longer of rather more than half the length of the achene.

A small and simple subaquatic species, obtained by Mr. J. M. Macoun at Rupert House, James' Bay, 5 Sept., 1885, n. 12,056. The plants might have passed for a possible depauperate state of some larger species, but that the chaff of the receptacle is developed in the petaloid direction quite beyond what is seen in any others, and the achenes have

also their marked characters. The specimens do not show cernuous heads; yet Mr. Macoun labelled them *B. cernua.*

✓B. GLAUCESCENS. Stout, often freely and widely branched, 1 to 2½ feet high, glabrous, the terete stem glaucescent, its internodes short and foliage ample: leaves elliptic-lanceolate, the largest 4 to 6 inches long, closely striate-nerved between midnerve and margin and as closely serrate: heads large, hemispherical: outer involucre surpassing the rays; these many (occasionally wanting): disk-corollas exceeding the awns, their tube longer than the short cylindric limb: achenes mostly 4-angled and 4-awned, the angles more or less corky, the main ones also tuberculate under each hair, the other two tuberculate but not bearing hairs.

In so far as I can recognize it in the herbarium this is peculiar to the western mountain districts and the plains adjacent, but beginning in Kansas, perhaps in Missouri. The following specimens may be cited. Kansas, Saline Co., Mark White, 1898; Pratt Co., Carleton, 1891; Kiowa Co., L. F. Ward, 1897; Atchison Co., Hitchcock, 1896 (n. 735). Colorado, H. G. Smith, 1888. Wyoming, A. Nelson, 1892 (n. 101). Utah, Kingston, M. E. Jones, 1894 (n. 5,978). The species forms some part of Mr. Wiegand's *B. cernua,* var. *elliptica.*

✓ B. LONCHOPHYLLA. Taller than the last, often 3 or 4 feet high, less branched and the branches ascending; leaves larger, often 6 or 8 inches long, thinner, more exactly lanceolate, more remotely serrate and less notably striate-veiny: stem green, not glaucescent, sometimes a little scabrous: bracts of outer involucre many, oblong, about as long as the rays, these golden-yellow: disk-corollas surpassing the awns: achenes mostly 4-awned, the principle angles

slightly corky, not tuberculate, the lesser ones represented by a slight and even not hairy suberous line; awns of half the length of the achene, notably unequal.

Species inhabiting Oregon and Washington, and represented in the U. S. Herb. by Cusick's n. 1,408, Elmers n. 1,247, Suksdorf's 932 and 1,592, and by n. 592 of Kirk Whited. Thus it will be seen to form also a part of *B. cernua elliptica,* Wiegand; perhaps also his *B. dentata.*

B. CUSICKII. Seeming perennial from rather slender horizontal rootstocks, yet perhaps only annual: stems 2 feet high, glabrous or setulose-scabrous: thinnish lanceolate leaves widely spreading, slightly connate, coarsely and rather remotely serrate: heads solitary and long-peduncled one terminal and one in the axil of each leaf, the lower peduncles amply leafy-bracted in the middle, the others naked; only the fruiting head nodding, all erect at flowering time: outer involucre ample, spreading, its bracts far surpassing the rays, finely spinulose-serrulate: broad yellow rays 6 or 8, about $\frac{3}{4}$ inch long, obtuse and with only an obscure suggestion of tridentation: disk-corollas with cylindric tube twice as long as the campanulate limb: achenes elongated and mostly linear-cuneiform, with narrow shortly aculeolate corky margins, and strongly striate between them; pappus of mostly 4 rather short and slender awns of a yellow color like the margins of the achene.

A fine species, known to me only from the eastern borders of Oregon, "Tules of the Grand Rond Valley," Cusick, n. 1,768. I can not say whether or not this was meant to be included by Mr. Wiegand in his *B. cernua,* var. *elliptica*; but that is unimportant, the species being very distinct from any and all eastern allies.

B. MACOUNII. Stout, rigidly erect; about 2 feet high,

shortly branched from all the axils and of strict habit; terete stems of a quite dark red-purple, scabrous below, glabrous toward the summit: rather broadly lanceolate leaves ascending, sessile by an auriculate base, the auricles overlapping the pair thus appearing as if connate-perfoliate though actually quite distinct, the margins closely but somewhat irregularly serrate-toothed: heads large, short-peduncled, nodding even in flower, nearly hemispherical; outer involucre inconspicuous, the bracts hardly equalling those of the inner set: rays neither numerous nor large, though perhaps always present: disk-corollas with short and subglobose limb about a third as long as the tube, the anthers conspicuously exserted: achenes elongated and of linear-cuneiform outline, 4-angled and 4-awned, the retrorse aculeolæ, or rather hairs, all slender, about equally so upon the awns and down the four angles of the nevertheless much compressed chestnut-brown and striate achene; the not very unequal and rather slender yellow awns of one-third the length of the achene.

A species of quite peculiar aspect among the others, in some ways suggestive of true *B. cernua*, but the pairs of ascending leaves with broad overlapping auricles, and the ascending or suberect short monocephalous branches bring it also into strong contrast with that species. It is known to me only in n. 457 of the Herb. Canad. Surv., and was collected by Mr. John Macoun, near New Westminster, B. C., 28 Aug., 1893. Mr. Wiegand included it in his *B. cernua elliptica*.

✓B. LEPTOPODA. Stems widely and dichotomously branching, probably at least 3 or 4 feet high, scabrous throughout though sparsely so: leaves lanceolate, serrate with remote short rather salient teeth, acute or acuminate, 3 to 4 inches

long (only the upper cauline known), sessile, not connate: heads solitary in the forks or peduncles 4 to 8 inches long, these naked, or with a pair of leaves below the middle: outer involucre of oblong-linear obtuse serrulate bracts of twice or thrice the length of the broad low-hemispherical head: rays 5 to 8, small for the head and inconspicuous, deep-yellow fading whitish: disk-corollas very short, the tube and limb of about equal length: achenes also very short, narrow-turbinate, 4-angled and 4-awned, less compressed than in related species, the angles somewhat suberous-thickened, tuberculate under the retrorse hairs; awns stout, of about half the length of the achene, more rigidly aculeolate.

In ditches at Brandon, Manitoba, 29 July, 1896, John Macoun, n. 12,180. A plant which, at first view, by its broad low head and small rays, suggested the north European *B. platycephala*, and I became suspicious of that as possibly introduced into Manitoba; but the further observation that the specimens in hand were mere branches of what must be a very large and rank ditch weed, and of remarkably dichotomous branching, removed all such apprehension.

B. RIPARIA. Low, simple or sparingly branched, only 4 to 6 inches high, the stems glabrous, striate: leaves lanceolate, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, remotely appressed-serrate: heads large for the plant, campanulate: outer involucre foliaceous, far surpassing the inner and the flowers, the bracts elliptical, spinulose-serrate: rays none; disk-corollas minute, the slender tube and short-cylindric or subclavate limb of equal length, the latter 4-toothed, greenish-yellow, marked for its whole length with 4 black lines: achenes cuneate, compressed-trigonous, the two margins cartilaginous-thickened and retrorsely but remotely hispid, the two longer and

stouter awns of more than half the length of the achene and slenderly retrorse aculeolate, the third awn, always present, two-thirds as long as the others.

On wet banks, in Jackson Co., Missouri, 30 Oct. 1893, B. F. Bush, n. 164. The species remarkable as combining almost the aspect of a dwarf simple-leaved *B. frondosa*, with the character of the *B. cernua* group as to the achenes. The heads, as seen in the dry, are not obviously nodding; but that they were so when living is evinced by the fact that Mr. Bush, who collected the specimens, distributed them for those of rayless *B. cernua.*

B. MARGINATA. Low and decumbent, branched from the base, 3 to 6 inches high, glabrous below, sparsely rough-pubescent above: leaves almost linear, 1 to 2 inches long, sessile but not connate, widely spreading, slightly serrate-toothed: heads many, short-peduncled, strongly cernuous, large for the plant, hemispherical; outer bracts exceeding the inner, oblong-linear, entire; inner dark-brown by many closely contiguous dark lines, but with conspicuous bright-yellow margins: rays few and small: disk-corollas with tube and limb about equal: achenes smooth, shining and of a dark red-purple, compressed-quadrangular, none of the angles corky or in any wise thickened, the two principal ones delicately retrorse-aculeolate; awns 4, nearly equal, slender, yellow, delicately aculeolate.

Near Salmon, Idaho, 31 Aug., 1895, L. F. Henderson (n. 3,855), distributed for *B. cernua*, and indeed very strictly of this group, though with beautiful specific characters.

6. *Segregates of* BIDENS CHRYSANTHEMOIDES, Michx.

This name, together with its synomym *B. lævis*, ill-advisedly made some years ago, embraces a considerable diversity

of plants inhabiting each its own section of U. S. territory and of adjacent Canada and Mexico; but the segregates that may easily be established do not seem to be as numerous as in the case of the aggregate *B. cernua*; and in an attempt to make out the species, and assign them names, one encounters difficulty in ascertaining to what plants certain old names really belong. Where this kind of difficulty amounts to a problem that can not be solved, there is plainly nothing to be done but to reject such name altogether, if one is to act rationally and philosophically. A name is not published, if it be not accompanied by a diagnosis such as enables a competent master of descriptive terminology to identify the species by it.

And who will assert that Linnæus' *Helianthus lævis* can be determined, from the description, either as given by him or implied, to be identical with *Bidens chrysanthemoides?* The answer that there is one herbarium fragment extant beyond the sea that proves it, is but an evasion; for the placing of a specimen in an herbarium, with a name, does not constitute publication. The name *B. lævis* should be discontinued, and will be, by as many as regard reason and use good sense in such a matter.

With Walter (1785) there is found a *Coreopsis perfoliata* which, the description itself being duly considered, must be understood as applying to some *Bidens* of this group. It is credited with oblong-lanceolate leaves undivided and partly connate, and with a pappus of two awns; it must therefore be some member of the *B. chyrsanthemoides* aggregate; but to none of the several segregates could it warrantably be applied; therefore it should be permitted to remain at rest.

It is at best, like most of Walter's names, a *nomen seminudum*.

Just what one of the several segregates which I might

propose should bear the name *B. chrysanthemoides* I can not yet determine, and therefore leave most of the northeastern and Virginian forms out of consideration for the present. The one which I name *B. formosa*, by the fact that its heads are slightly nodding in fruit, might have been placed in the *B. cernua* series, but that its achenes are those of the *B. chrysanthemoides* aggregate, being flattened and two-awned.

The several far-western members of the group may be named and defined with less risk of creating synonyms. Yet even here Mr. Wiegand has created difficulties by unfortunate attempts to apply certain early varietal names.

B. formosa. Manifestly several feet high, stout and with long internodes, glabrous: leaves elliptic-lanceolate, closely but slightly serrate, 2 to 6 inches long: heads large, long-peduncled, erect in flower, slightly nodding in fruit; bracts of outer series far surpassing those of the inner: rays 6 to 8, oval, very large and showy, more than an inch long and nearly a half-inch broad, obtuse though abruptly pointed by a small though obvious cusp; tube of disk-corolla not slender, much longer than the campanulate limb: achenes flat, 2-awned, not margined, the flat face bearing scattered retrorsely appressed short hairs, the two angles more closely aculeolate.

A remarkably handsome species, with large long-stalked almost dahlia-like heads, which, unless it be a rare plant, should have been better known. I know but a single sheet of specimens, this occurring in the U. S. Herbarium, accompanied by the very meagre legend "*Bidens chrysanthemoides*; Delaware Co., Pa."

B. leptomeria. Slender and almost simple, 2 to 4 feet high, sparingly leafy, glabrous: leaves narrowly lanceolate,

3 to 6 inches long and about equalling the internodes, evenly and rather coarsely somewhat appressed-serrate, sessile by a narrow base: peduncles about 5, very slender, nearly a foot long, with or without a pair of leaves in the middle: involucres erect both in flower and fruit, campanulate; outer bracts lanceolate, entire, an inch long and equalled by the broad deep-yellow abruptly acute rays: disk corollas greatly elongated yet not as long as the 2 or 3 very slender yellow awns, these of more than half the length of the linear-cuneiform chestnut-brown achenes, the angles of the latter minutely and sparsely retrorse-bristly.

Eastern Branch Marsh, near Washington, D. C., 7 July, 1878, L. F. Ward.

B. Parryi. Tall and slender: leaves barely equalling the internodes, 4 to 6 inches long, lanceolate or subfalcate, subserrately callous-denticulate, contracted at base and not connate: heads in a merely leafy-bracted or even almost naked terminal cyme, campanulate, nodding in fruit; outer involucre not equalling the 8 or 10 rays, these about an inch long, 15-nerved and 3-dentate: tube of disk-corolla twice the length of the campanulate limb: achenes short-cuneiform, much flattened, only 2-angled and 2-awned, both awns and angles retrorse-aculeolate, the awns short, but of more than half the length of the achene.

Species belonging to western Texas and adjacent parts, here defined, as to fruit, from n. 580 of the Mexican Boundary collection as represented in the U. S. Herbarium, and as to vegetative characters, from Palmer's n. 633 of the southwestern Texas plants, which I trust is the same, though not showing fruit. It is a remarkable species, and an unwelcome one, as uniting the habit of *B. cernua* and the fruit of the Platycarpæa group of species. The material

seems, by the geographical limits given by Mr. Wiegand, to form with him a part of *B. Nashii*, from the type of which it is assuredly most distinct.

B. PERSICÆFOLIA. A yard high or more, glabrous, the leaves 3 to 5 inches long and surpassing the internodes, lanceolate, acute, rather finely serrate, narrowed to a short almost petiolar base, not connate or even auricled: heads many, large, hemispherical; outer involucre scarcely exceeding the inner: rays about 8, oblong, $\frac{3}{4}$ inch long, 12-nerved: disk-corollas with stoutish tube little longer than the subcampanulate limb, the whole quite equalled by the long awns, these 2 only, closely but slenderly aculeolate: achenes not known.

Bradshaw Mountains, Arizona, 23 June, 1892, Mr. Toumey n. 680. Specimens in the U. S. Herbarium.

B. EXPANSA. Stems (or branches?) several feet long, simple, very leafy, apparently weak and reclining or at least strongly decumbent, terete, glabrous, glaucescent: leaves 2 to 4 inches long, lanceolate and elliptic-lanceolate, very acute, sessile, not connate, closely and evenly sub-serrate-denticulate with small callous teeth, or if more nearly serrate, the teeth still callous-tipped: heads large, on naked or bracted peduncles 2 to 4 inches long: outer involucre inconspicuous, barely equalling the inner; bracts of the inner copper-colored, lacking the usual close black lineation: rays about 10, golden-yellow, an inch long, 12-nerved, very obtusely and lightly 3-dentate at apex: disk-corollas with slender tube slightly exceeding the limb, the whole much surpassing the awns, these 2 only, shortly and rigidly aculeolate: achenes nearly black.

Southern California about San Bernardino, Parish, and at

Colton, G. W. Dunn. Only what seem to be long decumbent or reclining branches of this interesting plant are seen in the herbaria. The collectors, and botanical residents of southern California have not been interested in it, and their labels tell nothing of its habit or dimensions. The heads in size and showiness of ray emulate those of *B. formosa* of the East. Mr. Wiegand appears to have referred this to *B. Nashii*, through oversight of its peculiar habit and very decided characters. I suspect the root to be perennial.

B. Kelloggii. Stems several feet high, much branched, very leafy, the branches and peduncles sparsely scabrous or hirsute: lowest and largest leaves 5 to 8 inches long, lanceolate, coarsely and somewhat remotely serrate, of notably thin texture, sometimes connate at base, otherwise auricled: heads large, on short leafy branches or peduncles: bracts of outer involucre oblong-linear, twice as long as the inner and widely spreading, the inner closely dark-lineate almost to the margin: rays less conspicuous than in its Pacific coast congeners: disk-corollas short, the slender tube twice as long as the campanulate limb: achenes olive-green, rather strongly striate, 3-awned and 4-awned, the awns unequal, all slender and slenderly aculeolate.

Plant formerly common along streamlets and margins of lakes in the immediate vicinity of San Francisco; now if not wholly extinct, at least the earlier stations all obliterated by the city's growth; always, until Mr. Wiegand took it up, catalogued as *B. chrysanthemoides*; though the heads are always nodding in fruit; and Dr. Torrey, as the labels of the specimens collected on the Wilke's Expedition, being in his handwriting show, more correctly referred them to *B. cernua*, designating them as a variety

"elatior," which, I suppose to have been a slip of the pen for var. *elata*, Torr. & Gray. But I do not consider it identical with what Torrey and Gray had in view under that name. Theirs was an Oregonian plant; apparently synonymous with Nuttall's *B. quadriaristata*, var. *dentata*.

The diagnosis is here drawn up mainly from Kellogg & Harford's n. 437, collected long ago, at Lake Merced, San Francisco.

* B. AMPLISSIMA. Stems stout, obtusely angled, strongly striate, very leafy, apparently a yard high or more and dichotomously branched, at least above: leaves 5 to 10 inches long, all except the uppermost deeply and pinnately 3-parted, the lateral segments of $\frac{1}{3}$ the size of the terminal one, all of thinnish texture, elliptic-lanceolate and deeply incised or laciniate; the floral simple, somewhat hispid-ciliate at base: bracts of outer involucre $1\frac{1}{2}$ to 3 inches long, deeply incised like the foliage, spreading widely and many times surpassing the 10 or more comparatively small rays: disk-corollas very short, greatly surpassed by the awns, and the limb longer than the tube: achenes olive-green and striate, mostly 2-angled and much compressed, some 3-angled: pappus of 2 awns, or 1, or sometimes none at all, always when present retrorsely barbed, but the margins of the awnless achenes with aculeæ taking both directions.

This is a most remarkable *Bidens*, known to me only as collected by Mr. John Macoun on the Lomas River, Vancouver Island, 12 August, 1887, and distributed under the name *B. bullata*. I judge it to be gigantic among species of this group; and by its large divided leaves, its exaggerated outer involucre, and by the peculiarities of its achenes, it seems to connect with other groups of *Bidens*, as also with with *Coreopsis*.

Mr. Wiegand's description of his *B. dentata* reads as if he had included this most remarkable plant under that. But it can not in any reasonable probability have formed a part of Nuttall's *B. quadriaristata* var. *dentata*; indeed Mr. Wiegand's diagnosis actually excludes Nutall's plant, the essential character of which is, according to Nuttall, its dentate leaf-margin. But the leaves of *B. dentata*, Wiegand, are to be either serrate or incised or parted, a descriptive phrase which excludes the term dentate. Judging from plants extant in herbaria, such as Mr. Howell's from Sauvie's Island, which come from very near Nutall's station, the true *dentata* variety of that author is allied to *B. cernua* by its strongly nodding heads and quadriaristate achenes, and is by far smaller than any of the foregoing new species, and has its leaves commonly nearly dentate, though now and then exhibiting a margin that is between serrate and dentate. Such a plant, inhabiting as this does the seaward slope of Oregon, Washington and British Columbia, can rationally be accepted as in all probability identical with Nuttall's variety *dentata*; and there is no other known that can.

This practice of adopting an antiquated varietal name for a proposed new species without taking any pains to make sure of the identity of the old variety and the new species is a most reprehensible one, as tending only to instability instead of stability in names.

I would remark further, that the assuming Nuttall's variety *dentata* and Torrey & Gray's variety *elata* to be one and the same, as is done by Mr. Wiegand, seems quite gratuitous. I should readily predict that, if ever it is ascertained just what the two plants of old so named are, they will be found to represent each a good species. Both names had much better been left unused; for by such neglect of them confusion would have been less confounded.

Nor, indeed, has any botanist a right to apply any old name where he can not determine from the description what the original plant was.

7. *Generic Rank for* BIDENS BECKII, TORR.

In some particulars nearest of kin to *B. chrysanthemoides* and its immediate allies stands what has hitherto been known as *Bidens Beckii.* It is singular, among not only Bidentideæ but our American Compositæ as a whole, in being actually aquatic, as much so as *Ranunculus aquatilis.* The greater proportion of its foliage is submersed and capillaceously multifid, suggesting no other bidentideous foliage whatsoever, unless we should look upon that of *Coreopsis verticillata* as being analogous, which it scarcely is. But the few pairs of emersed leaves in this plant recall the foliage of *B. chrysanthemoides* and its near relatives; and the involucre is more like that of these than of other groups of *Bidens* species. But the flowers, whether of ray or of disk, have other characters. The rays here are both retuse and notched, instead of being obtuse and entire. In those specimens examined by me in which the rays are best preserved, I find the tip of the ray obcordate but with a distinct short cusp between the two lateral rounded lobes. It is a mode of apical tridentation not otherwise observed by me in this subfamily of composites. The disk-corollas are slender and clavate, as in the group to which *B. frondosa* belongs. The achenes, with their not at all compressed or angled but almost terete body, surmounted by the several long stout persistent awns of very great size and prominence, in relation to the essential part of the fruit, are what I consider to be those of an very good genus; and I name it

MEGALODONTA.

M. Beckii. *Bidens Beckii*, Torr. Fl. N. Y. i. t. 58; Gray, Syn. Fl. 298; Britton & Brown, Ill. Fl. 440, fig. 3950. Solitary head short-peduncled, the peduncle ½ inch long more or less: bracts of outer involucre obovate to oblong, nearly erect, resembling the inner, only of more foliaceous texture: rays broad and showy, about 12-nerved, retuse or almost obcordate at apex and 3-toothed, the acute middle tooth shorter than the obtuse lateral ones.

Important as characters of the corolla must be, they have been almost utterly disregarded here; probably not even investigated. In the original plate, in the New York State Flora, not the least intimation is given of the real form of the rays of this plant. In the figure given by Britton & Brown, there is some approach made to the truth, for there the ray is shown as retuse; but the draftsman, following the vaguest conventionalities as to the indicating of longitudinal nerves, has brought out three, whereas in the object as it exists, either fresh or dry, there are plainly from eleven to thirteen, all being of nearly equal prominence.

M. nudata. Submersed foliage ampler, apparently firmer than in the last, less apt to collapse when withdrawn from the water: heads smaller, on almost or quite naked slender peduncles 2 to 4 inches long, the 1 or 2 emersed leaves when present alternate and deflexed, dissected or at least pectinate-toothed: bracts of outer involucre much smaller than the inner, ligulate and spreading; those of the inner yellowish: rays oblong-linear, 7 to 9-nerved, narrowed and obscurely tridentate at apex: styles more slender, and more elongated than in the last: fruit not seen.

Apparently altogether distinct from the type-species by

the several characters indicated. I know it only from specimens collected at Lake Saratoga, in the Adirondack Mountains, N. Y., Aug., 1894, by T. F. Allen.

M. REMOTA. Smaller than either of the foregoing; submersed capillaceous foliage less ample, very thin, promptly collapsing, the emersed leaves rather numerous, more slenderly and pectinately toothed: head small: rays somewhat cuneate-oblong, with 3 prominent nerves and 3 to 5 much less distinct intermediary ones, the apex acutish, 2 or 3-toothed: styles short and their branches less acute: awns of the pappus nearly naked, showing only about 5 or 6 aculeolæ at the very summit.

Far-western species, known only from Green Lake near Seattle, Washington, where it has been collected in flower by Prof. C. V. Piper.

8. *Some New Eupatoriaceæ.*

Among the various genera that have been taken out of the Linnæan *Eupatorium,* it seems to me difficult to name one which is better entitled to stand than De Candolle's CONOCLINIUM. Dr. Gray, in reducing the group to *Eupatorium* again, does a serious injustice to its merits; for he says that, except as to the character of the receptacle, which is conical, rather than plane as in all other Eupatoria, it does not differ from that other group of which *E. aromaticum* is typical. Now, along with the excellent character of the conical receptacle, it has two others all its own. The involucre, though consisting of equal bracts, presents them in about three series, while in *E. aromaticum* and its kindred they are about one-third as numerous and are uniserial. But they are different both in form and in texture, in these

two groups; those of *Conoclinium* being singularly acuminate, and also of a firmness that does not recur in the other group. And there is an excellent character of the pappus which, in so far as I can find, has been overlooked by everybody, even by De Candolle. The members of the pappus are not capillary. They are distinctly, though slightly and very gradually dilated at base, and also much firmer and more awn-like than in *Eupatorium*. This peculiarity of the pappus, as well as the whole aspect and character of the involucre, and the general habit of all the species, forces upon us the conviction that we have here an assemblage of species much more nearly akin to *Ageratum* than to any phase whatsoever of *Eupatorium*.

The following species proposed as new are all from the far South and Southwest:

C. VENULOSUM. Evidently very tall, the longer floriferous branches almost a yard long, the main stem suffrutescent, the internodes of both stem and branches 4 to 6 inches long, terete, sparsely puberulent under a lens, but to the unaided eye appearing glabrous; leaves thin, 2 to 3 or 4 inches long including the short petiole, ovate to lanceolate-trigonous, truncate and subhastate at base, hardly acute at apex, rather closely crenate-serrate, deep green and scaberulous above, pale and white-veiny beneath, all the veins and veinlets hairy with divaricately spreading hairs: heads in 1 to 3 peduncled compound cymes at the ends of all the branches: flowers apparently rose-purple, achenes with a few resin-globules at summit: pappus very fine, but the bristles thicker at base.

Species very well marked by its large size and peculiarly elongated very veiny foliage, resembling that of some *Stachys*. I have it only in Tracy's n. 4,734 from Biloxi,

Mississippi, collected 19 Oct., 1898. From the specimens it appears to be a tall plant, with long slender branches that must be trailing, or at least reclining.

C. FLACCIDUM. Tall like the last, more leafy, the internodes shorter, the whole plant, seemingly glabrous, but stem and branches obscurely puberulent: leaves elongated-triangular, or the lower ovate-trigonous, either truncate at base or abruptly tapering to the short petiole, the largest 4 inches long including the petiole, all of very thin texture, not notably veiny, very lightly crenate, glabrous beneath and rather copiously gland-dotted, above glandless and very obscurely and sparsely strigulose: cymes almost sessile: heads very small: flowers deep red-purple: achenes sparsely resin-dotted throughout.

River Junction, Gadsden Co., Florida, Geo. V. Nash, n. 2572. Very different from the last by its thin-membranaceous deep green veinless foliage which is devoid of indument, but very glandular beneath.

C. NEPETÆFOLIUM. Firmly erect, about 2 feet high, branched almost from the base, a strong floriferous branch from the axil of each leaf, both stem and branches rather strongly villous: leaves deltoid-ovate, the larger 2 inches long, on petioles of one inch or less, all exactly crenate, the crenatures about 12 on each margin, all of thin texture, the upper face green and thinly strigose pubescent, beneath villous-hirsutulous along the veins and sparsely so between them: heads in compact cymes; involucres broad-campanulate, the flowers short, reddish, or purplish: achenes also short, sharply angled and much dotted with resin-globules: pappus more slender than usual, indistinctly broader at base, most of the bristles notably tortuous.

Known to me only from Indian River, Merrits' Island, Florida, where it was collected 31 July, 1896, by A. H. Curtiss, and distributed under n. 5,730. An exceedingly well marked species, with villous pubescence, and leaves closely simulating those of catnip not only in outline and indentation, but also in their softness of texture and pubescence.

An interesting though perplexing group of *Eupatorium* species exists in the herbaria under the name of *E. ageratoides*, the type of which, having been cultivated in Europe long before Linnæus, and more than once figured, is not of difficult identification. But as much can not be said of certain segregates proposed by different authors early in the nineteenth century. Among such are *E. urticæfolium*, Michx., *E. Fraseri*, Poir., *E. ceanothifolium*, Ell., and probably also the still earlier *E. cordatum* and *E. odoratum* of Walter. In efforts to identify these, and also some like early segregates of *E. aromaticum*, I have expended much time and toil within the last three years, and I trust with some measure of success. The results of such study may be given at some future day; but at present I shall offer only some names and definitions of species such as I am confident have not hitherto been published, at least in this rank.

E. EURYBIÆFOLIUM. Stem 2 to 4 feet high, sparsely dark-puberulent, amply leafy to the summit, floriferous branched from the middle, the branches with 1 or 2 pairs of reduced leaves; all the foliage thin, dark-green, the larger leaves 3 to 5 inches long, on petioles of an inch, spreading or ascending, surpassing the internodes, rather narrowly subcordate-ovate, acuminate, mucronulately serrate-toothed, the teeth

continuing half across the subcordate or subtruncate base and numbering about 20 on each side, venation not obvious except beneath, both faces nearly or quite glabrous: cymes lax and involucres narrow, their bracts about 10, thin and nearly glabrous, linear, lightly 2-nerved: flowers about 12; corollas with very slender tube and slightly shorter campanulate limb, segments with few hairs; styles well exserted; achenes oblong-linear, glabrous.

Rich woods about Knoxville, Tenn. A. Ruth, Oct., 1898, n. 715 of my set. Also in the U. S. Herbarium from the same place, 24 Sept., 1894, by S. M. Bain. Its affinities lie with *E. ageratoides.* The foliage in this bears much likeness to that of some Asters of the *A. macrophyllus* group.

E. VIBURNIFOLIUM. Slender, 2 or 3 feet high, green and seeming glabrous, but stem and peduncles puberulent: leaves thin, about 2 inches long on slender petioles of ½ inch, the whole much shorter than the internodes, lamina narrowly ovate, usually somewhat rounded at base, evenly and coarsely dentate, the teeth about 7, or occasionally 5 only, to each side, prominently 3-nerved, the nerves and veinlets whitish in contrast with the deep green of the leaf, lower face paler and scaberulous, the upper face and the margins with some scattered stiff hairs: inflorescence borne above the leaves and somewhat naked-panicled: involucres long and narrow as in the last, about 7 to 10-bracted and with a similar number of flowers, the linear bracts somewhat strigose-pubescent, only obscurely striate: corolla-lobes notably hairy at tip; styles not much exserted: slender achenes linear, glabrous.

Borders of woods near Knoxville, Tenn., Aug., 1898, collected by A. Ruth (n. 718 of my set), and distributed by him, at my instance, as *E. aromaticum.* Almost the same,

though with a more ample and lax panicle of rather narrower heads, was distributed by A. H. Curtis from dry pine barrens near Jacksonville, Florida, (n. 5,339) under the same name; but it is constantly most unlike the true *E. aromaticum*, and very readily distinguished. The foliage, in outline and toothing, is much like that of *Viburnum dentatum.*

E. ANGUSTATUM. Several feet high, stoutish and rigid, freely and divaricately branching from below the middle of the stem, this subterete, glabrous: leaves thinnish, 2 to 4 inches long, ovate-lanceolate, acuminate, often subfalcate, remotely serrate except at the cuneate base, the not very slender petioles $\frac{3}{4}$ to $1\frac{1}{2}$ inches long: heads subcorymbose at the ends of all the branches, the pedicels puberulent; bracts of involucre very sparsely so, linear-spatulate: corollas with tube and funnelform limb of about equal length: styles well exserted: achenes slender, strongly 4 to 6-angled, the angles apt to be scabrous-ciliolate.

My specimens of this are from western Louisiana, where they were collected by the late Rev. Father Langlois. They no doubt represent well the *E. ageratoides* var. *angustatum* of Gray; but the plant is much more clearly distinct from *E. ageratoides* than that is from *E. aromaticum.*

E. ABORIGINUM. Two feet high and with many ascending or somewhat spreading leafy and floriferous branches, both stem and branches puberulent, the minute hairs white: leaves rather broadly ovate, acute or abruptly acuminate, coarsely serrate except across the very abruptly tapering base, thin, deep-green with light-colored triple and branching veins, glabrous above, scaberulous beneath: cymes very shortly peduncled and their subtending leaves not much

reduced, the whole inflorescence thus appearing leafy: pedicels strongly puberulent: bracts of involucre more sparsely somewhat pubescent: proper tube of corolla shorter than the campanulate-funnelform limb: styles notably exserted and their tips slender: achenes rather short, black, strongly angled, glabrous.

Sapulpa, Indian Territory, 1 Oct., 1895, B. F. Bush, n. 1440 of my set; labelled *E. ageratoides*, but of different aspect altogether, being much more branching, leafy and floriferous, with firmer foliage and that of different cut.

E. NEMORALE. Stems 2 to 3 feet high, pubescent below, the flowering branches and peduncles tomentulose: leaves rather thin, deltoid-ovate, truncate at base and short-petiolate, the largest 2½ inches long by 1¾ inches broad near the base, coarsely crenate-serrate, the indentations about 10 to each margin, both faces very sparsely short-hairy: inflorescence an ample and almost naked cymose panicle: bracts of involucre somewhat biserial and slightly unequal, spatulate-oblong, obtuse hirtellous and ciliate: corollas with slender tube and campanulate limb about equal, the tips of the lobes sparsely villous: style branches almost filiform and little exserted.

Along the borders of woods about Knoxville, Tenn., Aug., 1898, A. Ruth, n. 719, distributed as *E. verbenæfolium*, and this by my own too hasty determination. I was misled by the broad and obtuse involucral bracts, and some other points at which it diverges from *E. aromaticum* to which it is nearly related, rather than to *E. verbenæfolium*.

E. TRACYI. Rigidly erect, often stoutish, 2 to 4 feet high, amply corymbose-panicled sometimes from below the middle of the stem, this terete, scabro-puberulent, often minutely

purple-dotted or -streaked: leaves numerous, about equalling the internodes, 1 to 2 inches long, divaricately spreading or somewhat deflexed, of very firm texture, scabrous above, minutely rough-pubescent along the veins beneath, generally of ovate outline with rounded or else abruptly tapering base, coarsely but not deeply crenate-toothed: heads very many, rather loosely cymose; involucres narrow, only about 10-flowered, their linear bracts with long 2-striate body and short thin tips: corollas with slender tube and narrow-campanulate limb about equal: achenes glabrous, black; pappus very fine, scabrous.

Seemingly a very common analogue of *E. aromaticum* along the coast of the Gulf of Mexico from western Florida to Louisiana, abundant specimens having been distributed by the late Rev. Fr. Langlois, and by Prof. S. M. Tracy; those of this collector being represented by his numbers 5,056, 6,447 and 6,448. It differs from *E. aromaticum*, its correlative belonging to Virginia and regions northward, by its larger size, more branched and copiously floriferous growth, but especially by its small rigid rough foliage, narrower and fewer-flowered involucres, etc. I have duly considered the possibilities of its proving identical with *E. cordatum* Walter, a species to be restored.

E. HERBACEUM. *E. ageratifolium*, var.? *herbaceum*, Gray, Pl. Wright, ii. 74. Stems very leafy to the summit, the leaves large, thin, ovate-trigonous, 2 to 3 inches long, nearly 2 inches wide at base, acute, serrate-toothed, not conspicuously veiny: cymes terminal, nearly sessile, partly embraced by the uppermost pair of leaves, these being scarcely smaller than the others: bracts of involucre lanceolate, in an almost double series, the outer shorter: corollas elongated, tubular-funnelform, scarcely exhibiting distinction

of tube and limb: some of the outer achenes 10-nerved, all setulose-pubescent.

Species apparently not collected except by Charles Wright; mistaken by Dr. Gray latterly for the equivalent of his var. *Arizonicum*, from which it differs very much in general appearance, being much more herbaceous and leafy, and showing a different involucre as well as corollas of quite another form. Its habitat is somewhere in eastern New Mexico or adjacent Texas. What are probably the original specimens exist in Wright's distribution under n. 1,147.

E. ARIZONICUM. Suffrutescent, 2 feet high, rather widely branching, the very minutely scaberulous stem and branches striate-angled: leaves all opposite, deltoid, 1 to 2 inches long, on petioles of ½ inch, serrate-toothed, venulose, scabrous beneath, especially on the veins, otherwise glabrous: cymes dense and short-peduncled: bracts of involucre in 2 somewhat unequal series, rather strongly scaberulous: corolla white or pinkish, the tube shorter than the oblong subcylindric limb: styles exserted, their branches filiform but with short thick tips: achenes setulose.

Common in the mountains of Arizona and adjacent New Mexico, and forming the chief part of Gray's *E. occidentale* var. *Arizonicum*, but wholly distinct from the real *E. occidentale* by many characters.

9. *Certain Species of* ANTENNARIA.

As the pioneer in research upon the identity of the *Gnaphalium plantaginifolium* of Linnæus, I have naturally read with interest Prof. Robinson's recent paper discussing some old specimens still preserved in London herbaria[1]; not, how-

[1] RHODORA, iii, 11.

ever, as having anticipated that anything decisive about the identity of that plant would be likely to be obtained from such a source. During the whole course of my own studies I could not think of it as worth while to ask my obliging friends of the Linnæan Society, and of the British Museum, to make search and report to me what specimens might be extant there to throw light on the text of Linnæus and his contemporaries. It seemed to me that no specimens but those of Plukenet and of Clayton or Gronovius could be of importance, and even these, of no great moment; for Plukenet's figure is in itself sufficiently indicative of my *A. decipiens.* I have never doubted that, since I learned to distinguish *A. arnoglossa, decipiens* and *fallax.* But Gronovius seemed to have included under his plantain-leaved species, what I at length named *A. arnoglossa*; for he has not only Plukenet's White Plantain, but also another which he confuses with it, the foliage of which is said to be "hoary-tomentose beneath." This I have naturally assumed to be my *A. arnoglossa*; and I should at any time have been curious to see the Claytonian n. 287. It is therefore very interesting to be told, as we are by Prof. Robinson, that the specimen in the British Museum representing Clayton's plant is *A. solitaria.* There is reason to wish that other specimens of this Claytonian number may be extant; for I can hardly believe the plant actually seen and described by Gronovius to have presented a solitary head. This man was too ardent a disciple of Linnæus, and too complete a master of the Linnæan system of terminology to have allowed himself to describe by the phrase "*caule capitato*" a plant of the compositæ which exhibited at the top of its stem only one head. All such composites were everywhere described by Linnæus and his followers, and that until the earlier part of the nineteenth century, as "*caule unifloro.*" In trying to identify

these old composites it must never be forgotten that, in all the old synantherology, what we of today call a capitulum was called a flower; that our involucre of the compositæ was always with them a calyx. It is, therefore, contrary to all reason to suppose that Gronovius had any monocephalous stem in mind, or before his eye, when he wrote the descriptive phrase *caule capitato*; and I am obliged to think that, under Clayton's n. 287 there must have been specimens of some other *Antennaria* besides that one which is said to represent *A. solitaria*, and such as exhibited, along with the glabrous upper face of the leaves, a capitate cluster of heads; or plainly, my *A. arnoglossa.*

As for specimens existing in the Linnæan Herbarium, it must be remarked that such must first be shown to have been type specimens, before any forceful inferences can be drawn from them. It is well known to many of the disappointed people who have tried, during the last century, to find in that herbarium evidence upon the identity of species, that the collection was continually being augmented during the quarter-century of Linnæus' life after the publication of the *Species Plantarum*; that he again and again put into it specimens which he *supposed to represent* species which he had published on purely bibliographic data.

That those *Antennaria* specimens are type specimens no one knows. That they are the identical ones which Linnæus said he had seen, no one knows. May be they are; we may even say probably they are; but still they are hypothetical evidence in the case, and therefore no real evidence at all. Nor is it, in my view, of any importance that they should be verified, if they can be, as type specimens. Linnæus' *Species Plantarum* is a classic piece of bibliography, and only partially, and often then very ambiguously, of the nature of a nineteenth century descrip-

tive flora based on type-specimens. The ability to identify his species is the ability to succeed in critical and often difficult bibliographic research.

In the case before us, there is nothing in what Prof. Robinson denominates "Linnæus' uncompiled portions of his description," and again, "his own technical description" to indicate anything more than some *Antennaria* with large ovate radical leaves. It applies equally to any one of a half-dozen species now recognized. His first-cited synonym, that of Gronovius, assures of the intended inclusion, on the part of Linnæus, of both the White Plantain, which we may agree to have been *A. decipiens*, and also another with foliage tomentose only underneath; this, from its capitate-clustered heads, to have been *A. arnoglossa*, or as including also, though doubtless unconsciously and by accident, *A. solitaria.*

And so there are reasons for assuming *A. arnoglossa* to be entitled to the name *A. plantaginifolia*, though perhaps rather more cogent reasons for applying it to either *A. decipiens* or *A. fallax.* Still, every one of those applications of that name will be hypothetical. And I, for my part should be willing to retain the name *A. plantaginifolia* as applied to *A. decipiens* if only Plukenet, the real author of the specific name, were to be credited with it. But the specific name as applied by Linnæus, we all agree, covers a mixture.

Let me, in conclusion say, that I have given the names *arnoglossa, decipiens* and *fallax*, with the distinct purpose of hereafter giving recognition to the name *plantiginifolia* only in synonymy. It is a kind of procedure which has been approved in many another case by the best of botanists, when dealing with such Linnæan aggregates as, like this, furnish no segregate which can be called typical except hypothetically.

I have long neglected to define a certain new *Antennaria* distributed from Montana by Mr. Rydberg as representing my *A. foliacea*. I may call this

A. OXYPHYLLA. Stolons short, densly leafy with rather small spatulate-obovate and oblanceolate leaves, these densely silky-tomentose beneath, less so above: flowering stems a foot high more or less, purplish underneath a scanty investiture of somewhat flocculent or arachnoid silky wool, and this ultimately more or less deciduous: stem-leaves many, as long as those of the stolons but narrow, narrowly oblanceolate to linear, cuspidately acute: corymbs in the pistillate plant rather dense, polycephalous: outer bracts of involucre brownish at base, their white tips short, obtusish, those of the several other series with more elongated tips successively ovate, ovate-lanceolate and linear-lanceolate, all acute and of a rather dull white.

Spanish Basin, Gallatin Co., Montana, n. 5,148 of Rydberg & Bessey's 1897 collection. Plant very different from the real *A. foliacea*, the cauline leaves far less ample.

Vol. IV. Part 25.

PITTONIA.

A Series of Botanical Papers

BY

EDWARD L. GREENE.

Professor of Botany in the Catholic University of America,

Washington, D. C.

October, 1901.

CONTENTS:

	PAGE
Some Neglected Violets,	285
New Species of Cerastium,	297
Five New Species of Rumex,	304
Corrections in Nomenclature—IV,	307
Studies in the Cruciferæ—IV,	307
1. New Species of Lesquerella,	307
2. Miscellaneous New Species,	311
New Species of Laciniaria,	315
New or Noteworthy Species—XXIX,	318
New Species of Monardella,	321

Price, Fifty Cents.

Payot, Upham & Co., *San Francisco*: William Wesley & Son, *London*.

SOME NEGLECTED VIOLETS.

A very considerable number of Canadian species of the division of purple-flowered caulescent violets have been in my herbarium, awaiting critical study, for a number of years. Nearly all of these have been furnished by Mr. J. M. Macoun. To these a few more have been added this season, by Dr. James Fletcher; and the endeavor to report to the latter the names of the species he has sent, has been made the occasion of a critical survey of this whole group, the known forms of which have for years past been allowed to be treated as representing merely a few varieties of the Old World *V. canina;* a violet which doubtless has no place in the North American flora; and most of the new ones herein defined, are established upon excellent characters.

V. FULCRATA. Low, stoutish, apparently glabrous, pale and glaucescent, only the margins of the leaves and stipules exhibiting a few short stiff hairs: leafy stems only two or three inches high, the few peduncles about as long: leaves ovate, obtuse, often with rounded basal lobes and closed sinus, the whole margin lightly but distinctly crenate, the blade about an inch long, the petiole somewhat larger; stipules small, oblong-lanceolate, incisely serrate: peduncles firmly erect, bibracteolate below the middle, the bractlets almost opposite, notably herbaceous, spatulate-linear, commonly with several serrate teeth: sepals broad and obtuse, not scarious margined, 3-nerved: corolla an inch in length, petals all very broad and ample (for this group), the keel broadest of all, equalling the others in length, obcor-

date by an abrupt and rather deep apical notch; spur almost as long as the limb, very thick, straight and obtuse.

Cowichan River, Vancouver Island, J. R. Anderson, 2 June, 1898; communicated by Mr. Macoun. The species must be a very beautiful one, by its neatly cordate pale foliage, and large broad-petalled flowers. Its large almost leafy and distinctly toothed bractlets, situated low on the peduncle, are a very notable characteristic. My specimens bear the Canadian Survey number 19,912.

V. PETROPHILA. Tufted stems ascending, 3 inches high and slender, as are also the petioles and peduncles; herbage glabrous except a scanty hirsutulous hairiness at and near the margins of the leaves and along the angles of the petioles; leaves subcordate-ovate, seldom $\frac{3}{4}$ inch long, on almost filiform petioles twice or thrice as long, crenate; stipules small, lacerate-toothed; peduncles elongated, almost filiform, slenderly bibracteolate near the flower; sepals subulate-lanceolate, corolla scarcely $\frac{3}{4}$ inch broad; petals narrow, but the keel broadest, equalling the others, obtuse; spur long, narrow, curved downwards.

Crevices of Rocks, Shawnigan Lake, Vancouver Island, 9 May, 1897, J. R. Anderson, the specimens communicated by Mr. Macoun. Like *V. subcordata* (Pitt. iii. 316) in habit and leaf-outline, but otherwise quite dissimilar, especially as to pubescence, the small size of the corolla, and the narrow downwardly curved spur.

V. COMPACTA. Dwarf and condensed, the entire plant including the large flowers only 1 or 2 inches high, in appearance acaulescent, the tufted leaves barely $\frac{1}{2}$ inch long including the petiole, this and the blade of about equal length, the latter round-ovate, obtuse, crenate, sparingly

hirtellous; peduncles rather numerous, minutely hirtellous-puberulent, bibracteolate near the flower, the bractlets opposite, herbaceous, spatulate-linear; sepals oblong-lanceolate, obtuse, not scarious-margined, glabrous: corolla large for the plant, 7 or 8 lines broad; petals consimilar, all with rounded obovate blade, the keel as large and as long as any; spur prominent but not elongated, thick and obtuse.

This curious dwarf, so perfectly resembling an acaulescent species, was obtained along with *V. petrophila*, from crevices of rocks about Shawnigan Lake, Vancouver Island, by Mr. Anderson; and these two were distributed as if taken for representatives of the same species, under the Canadian Survey number 19,910. But an investigation of the characters renders it impossible to treat the present plant as a dwarf and condensed state, either of *V. petrophila* or any other species recognized.

V. Andersonii. Caulescent, the short decumbent stems and elongated petioles and peduncles stoutish and commonly glabrous, or nearly so: leaves broadly cordate, 1½ inches long and quite as broad, the earliest smaller and approaching reniform, all obviously crenate, appressed bristly-hairy along the veins above, marginally ciliolate, nearly or quite glabrous beneath; stipules lanceolate, incisely toothed: peduncles 5 or 6 inches long and surpassing all the foliage, bibracteate near the middle but the bracts remote; sepals lanceolate, ciliolate: corolla not large for the plant, about ¾ inch long, the petals subequal, or the pair next the keel exceeding it in size; spur short and thick.

Thetis Lake, British Columbia, 28 April, 1900, collected by Mr. James R. Anderson. Very well marked, as a species of the *canina* group, by its broad-cordate leaves of large size,

and with an indentation more typically crenate than in any of its American allies. The corollas are nearly white in the dry, and may have been light-blue when fresh.

V. OREOCALLIS. Size and mode of growth as in the last, but peduncles and petioles more slender, the leaves thinner and the whole herbage puberulent: leaves cordate-ovate, obtuse, very lightly and almost obscurely crenate, not ciliate, truly puberulent above, beneath rather hirtellous along the veins; stipules small and narrow, sparingly incised: peduncles bibracteolate far above the middle and the bractlets contiguous: sepals glabrous: corolla more than an inch in diameter, all the petals spatulate-obovate, the keel much the largest and longest; spur rather short, thick and obtuse.

Mill Hill, British Columbia, 29 April, 1900, J. R. Anderson. Differs altogether from *V. Andersonii* by its leaf-outline and indument, as well as by its larger flowers, with petals of quite other proportions. The specimens both of this and the last preceding were communicated to me by Dr. Fletcher of Ottawa.

V. ALBERTINA. Stems low, 2 or 3 inches long, ascending, from a slender simple or branched fibro-ligneous rootstock; herbage hirtellous-puberulent, peduncles and petioles more densely and somewhat retrorsely hirtellous: leaves from suborbicular (in the lowest) to round-ovate and deltoid-ovate, obtuse, finely and evenly crenate, $\frac{1}{2}$ to nearly 1 inch long, on petioles nearly twice as long; stipules lanceolate, subpinnately incised toward the base: peduncles quite surpassing the leaves, conspicuously bibracteolate toward the summit, the bractlets opposite, linear: corolla blue, $\frac{3}{4}$ inch long, the keel petal somewhat shorter than the others,

distinctly broader, emarginate or even almost obcordate; spur as long as the blade, abruptly and obliquely acute at the end.

Apparently common to the eastward of the McLeod River, northern Alberta; collected by Mr. W. Spreadborough, June, 1898, and communicated to me by Mr. J. M. Macoun.

V. FILIPES. Near the last, but the proper stem almost obsolete, the leaves and flowers tufted at the ends of the fibrous root-crown or its branches; herbage glabrous: leaves cordate-oval, the shallow sinus often closed by the overlapping of the rounded basal lobes, obtuse, remotely and obscurely crenate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long when young, those of later and fruiting specimens often more than 2 inches long, on almost filiform petioles of 2 to 4 inches: flowers quite surpassing the foliage, and on very slender peduncles; corolla little more than $\frac{1}{2}$ inch wide, the petals deep purple, all rather narrow, the keel about equalling the others, the spur very long, cylindric, rather narrow, obtuse, curved upwards.

Borders of a meadow in the half desert region of Modoc Co., California, June and July, 1893, Milo S. Baker. Remarkable in this group as being apparently acaulescent; the peduncles and petioles in the later and fruiting specimens very long and slender, but the proper leaf-bearing stem never obviously developed.

V. CARDMINEFOLIA. Caulescent, the numerous slender decumbent or more depressed stems 3 to 5 inches long: leaves small, the subcordate-ovate obtuse minutely crenate blade often merely $\frac{1}{2}$ inch, seldom $\frac{3}{4}$ inch long, of firm texture, obscurely pulverulent-puberulent, the slender petioles about 1 inch long; stipules lanceolate, the lowest serrate-ciliate, the upper nearly entire except toward the base:

slender peduncles little more than an inch long, bibracteolate much above the middle: sepals subulate-lanceolate, glabrous: corolla small, deep-blue; spur elongated, oblique.

In rocky woodland near Aylmer, Quebec, Canada, 6 June, 1901, Dr. J. Fletcher. Allied to the common *V. Muhlenbergiana* of the U. S. (now righly or wrongly called *V. Labradorica*), but easily distinct by its small, thick and somewhat fleshy foliage always of ovate outline and obtuse; the flowers not half as large, much more deeply colored, and with a different spur.

V. RETROSCABRA. Root long and deep, with short branched crown or caudex, the proper stem at time of petaliferous flowering not developed, the large long-petioled foliage quite surpassing all the flowers, in outline from subcordate-deltoid to codate-ovate, 1 to 2 inches long and ¾ to 1½ inches broad, the sinus broad and open, the margin unevenly crenate, petioles of the largest 3 inches long or more, the whole herbage more or less hirtellous and this hairiness retrorse when occurring on the petioles and peduncles; the latter bibracteolate, at about the middle: sepals subulate-lanceolate, acute, often puberulent: corolla about 10 lines long, pale-violet or bluish, petals rather narrow, the keel as long as the others and rather broader: stems developing in summer to the length of 2 or 3 inches, and bearing numerous small apetalous flowers, these succeeded by short ovoid capsules.

A plant of southern Colorado, first known to me in some autumnal specimens collected by myself in exssicated bog land near Cimarron, 1896. Similar specimens were distributed from near Mancos, by Baker, Earle and Tracy, in 1898, under number 116. Others, also late and only in fruit, were distributed by Mr. Baker, from Pagosa Springs in 1899. Lastly, excellent flowering specimens are now at hand from

Mr. Baker from two localities near Cimarron, to be distributed by him later, under numbers 68 and 144 of his plants of the Gunnison region of the year 1901.

V. UNGUICULATA. Size of the last, but leafy stem well developed at earliest flowering, the peduncles short, not exceeding the leaves; herbage much more pubescent, even quite hirtellous throughout; leaves much smaller, only the lowest rounded and subcordate, these little more than ½ inch long and broad, the others of more oval outline, very obtuse at both ends, or some tapering to the petiole: peduncles 1½ inches long, bibracteolate near the flower, the bracteoles linear, elongated and conspicuous: sepals lanceolate, acuminate: corolla little more than ½ inch long, the petals subequal, but the keel broadest; spur well elongated, rather narrow, curved upwards, ending in a very narrow claw-like curved appendage.

Known only in a single specimen collected by the writer nearly a quarter of a century ago, in the Greenhorn Mountains, Southern Colorado; very interesting on account of the slender claw-like hollow appendage terminating the proper spur.

V. DESERTORUM. Allied to the last two, rather more strongly hirtellous throughout, taller, the leafy stems well developed at early flowering, often 5 to 7 inches high and ascending or suberect: leaves somewhat deltoid-ovate, acutish, mostly 1 to 1½ inches long, rather obscurely crenate-serrate and notably veiney, quite distinctly cucullate at the rounded base when young, and more or less obviously so even in maturity; stipules lanceolate, with a few lacerate teeth: peduncles filiform, none from amid the long-petioled basal leaves, all from the axils above, 2 inches long, almost or altogether glabrous, bibracteolate very near the flower,

and the linear bracts long: sepals narrow-lanceolate, glabrous, 1-nerved, in age almost carinately so: corolla little more than ½ inch long, petals subequal, all narrow, almost oblong; spur elongated, rather slender, cylindric, acute at the upper side at the end.

In the Star Valley meadow lands in the midst of the desert region of middle Nevada, at the foothills back of Deeth, 19 July, 1896, collected by the writer. The spur in this species makes some approach to that of the Pacific Coast *V. adunca*, in which that organ is more distinctly hooked, and with a sharper angle at the end, on the upper side.

V. BELLIDIFOLIA. A tufted dwarf, the whole plant barely 2 inches high, appearing as if acaulescent, the leafy stem undeveloped; herbage glabrous, slightly fleshy; leaves long-petioled, the subcordate-ovate, ovate and oval blades near ½ inch long, subentire or slightly and for their size coarsely crenate: numerous peduncles either barely equalling or somewhat exceeding the leaves, bracteolate above the middle: sepals oblong-lanceolate, acute, nerveless: corolla less than ½ inch long, strongly nodding, the long curved spur as strongly ascending.

I would indicate as the type of this Colorado species, Baker, Earle and Tracy's n. 287, from a mossy bog in Slide Rock Cañon, west of Mt. Hesperus, 2 July, 1898. Their n. 221, from the Bear Creek Divide, is even more dwarf, and grew on drier ground. It bears, however, about the same foliage and the same flower, and can hardly be specifically different. Number 166 of the same collection, though much larger, and less acaulescent, may also be specifically identical.

. . . .

Continued study and comparison of acaulescent purple-

flowered violets from various localities, chiefly northern, has led to the recognition of several more species which seem to have remained hitherto undescribed.

V. Illinoensis. Herbage rather deep-green but lucid, glabrous, in no degree succulent: leaves from stoutish ascending branched rootstocks and of notably triangular outline, the earliest cordate-deltoid, the later ones more hastate-deltoid, saliently crenate-serrate, acute: petaliferous flowers borne rather above the leaves, their bractlets inserted near the middle of the peduncle: sepals oblong-lanceolate, finely serrulate-ciliolate; petals of a pale violet-blue with an obvious greenish tinge, the uppermost pair darker than the others and with a deep-violet spot at base of blade, these also longer and broader than the second pair which are twisted and deflected, and hirsute at base with long slender abruptly clavellate hairs, the keel-petal long, almost liguliform, strongly veined with dark-violet: apetalous summer flowers on very short ascending or nearly horizontal peduncles, or some of them fairly underground, their short oval pods strongly trigonous.

This well marked woodland violet of Central Illinois is common in rich open woods along the Sangamon River, near Monticello, and is here described from specimens which, transmitted thence to Washington in the autumn of 1899, have thriven and flowered with me during two successive seasons. There is no other violet with which to compare it as a very near relative, unless it be *V. affinis,* and it is far enough removed from that by many peculiarities.

V. subviscosa. Rootstocks not much branched, slender, short-jointed and knotted; plant 4 to 6 inches high at time of petaliferous flowering: leaves thin, deep-green, shining

and slightly clammy, very sparsely appressed-hairy above, somewhat hirsute beneath along the veins and sparsely ciliate, in outline from cordate-reniform to broadly cordate with deep and often almost closed sinus, subserrately crenate, the more strictly cordate ones about 2 inches in diameter and little longer than broad: peduncles about equalling the leaves, bibracteolate below the middle, more or less strongly hirsutulous, as are also some of the petioles: sepals oblong, obtuse, strongly and closely ciliate with spreading or somewhat retrorse hairs: corolla violet, large, about $1\frac{1}{4}$ inches wide, the petals not very dissimilar, rather broadly obovate, the keel as broad as the others and very obtuse.

A most beautiful northern violet, remarkable for its slender rootstocks, each bearing a few large thin dark leaves and common only on large flower. The species was first recognized by me a year ago last June, in some excellent specimens sent me from Prince Edward Island by Mr. L. W. Watson. I at once diagnosed it as new, but the manuscript became misplaced. This year a fine sheet of specimens was sent from Aylmer, Quebec, by Dr. J. Fletcher, who describes the plant as growing in open spaces among woods, and flowering there early in June. The corolla, though of a deeper color, is so much like that of *V. septentrionalis* that I at first thought of it as too near that species, but comparison shows a widely different rootstock, very different foliage, etc. *V. septentrionalis* has a heavier foliage, of a light green shade, wholly devoid of clamminess, each leaf with a broad open sinus, and each branch of its stout rootstock produces a considerable cluster of leaves and flowers. I may remark, lastly, that some specimens received from Dr. Ezra Brainerd, collected in damp woods near Pleiad Lake, western Vermont, in 1899, and which I then referred with some hesitation to *V. septentrionalis*, are

now quite clearly seen to be of the present species. These Vermont specimens were taken late in July, and show only the late apetalous fruiting; these peduncles being short and horizontal, but not at all subterranean.

V. CRENULATA. Tufted perennial with rather stout ascending rootstocks, the whole plant small, and with light-green glabrous herbage: earliest leaves from deltoid-subreniform to deltoid-ovate, obtuse, ½ to ¾ inch broad, on petioles not much larger, very closely and minutely crenate, the later leaves twice as large, cordate-ovate, cucullate, subserrate-crenate, on petioles 1 to 2 inches long: peduncles many, 3 to 5 inches long, erect, far exceeding the foliage, almost colorless and white-translucent, bibracteolate below the middle and the bractlets usually quite remote from each other: sepals small, oblong-lanceolate, obtuse; corolla large, pale-violet; petals spatulate-obvate, obtuse or retuse, the odd one commonly quite obcordate-notched and very strongly veined with dark-violet, its surface also adorned with scattered white papillæ, the two next to it each with a dense small tuft of mostly clavate hairs: late apetalous flowers on short abruptly deflected pedicels.

The specimens of this very well marked violet are from near Syracuse, N. Y., and were communicated in a living state by Mr. H. D. House. It is a bog-meadow plant, and this fact, along with the light-colored herbage, and flowers much paler than those of *V. cucullata*, denote its affinity for that species. It has petals somewhat like those of the Canadian *V. vagula*, at least as to their being retuse or even obcordate-notched; but the pubescence of the petals is very different. The foliage of *V. crenulata* suggests that of the Canadian *V. venustula* by its small size and very marked crenulation. Otherwise, however, the two are very dissimilar.

I have no doubt that what I here define and name as new, has been treated as the equivalent of the *V. palustris* of the Old World; but the plant so named in our books has not been reported from so far south as New York; nor is our *V. crenulata* at all suggested by Britton and Brown's figures of so-called *V. palustris*.

V. Fletcheri. Acaulescent, small, the simple ascending rootstock rather small for the plant, closely jointed: leaves few, small, from ovate-reniform to subcordate ovate, ¾ to 1 inch long at time of petaliferous flowering, the undevoloped ones cucullate, all very regularly crenate, glabrous and shining above, mostly sparse-hirsutulous beneath and on the petioles, these in the earliest not longer than the blade, in the later more than twice as long: flowers very few, often 1 only; peduncles hirsute, minutely bracted below the middle: sepals small, lanceolate, veinless, serrate-ciliolate: corolla large, more than ¾ inch broad, rich purple; the upper pair of petals much the largest, obovate, the middle pair narrower in proportion and strongly bearded with long cylindric hairs, the odd one as long as these and a trifle broader: apetalous flowering and fruiting not known.

Common in certain moist open grounds, growing among mosses, near Ottawa, Ontario, Mr. J. M. Macoun. Plant of about the size of *V. venustula*, but with very different characters, and holding perhaps the same relation to the common *V. papilionacea* which *V. venustula* bears to *V. cucullata*. The individuals are said by Mr. Macoun to grow singly, and to be often one-flowered. The leaves at time of petaliferous flowering are only three or four. Some small plants of *V. blanda* accidentally accompany the living specimens, showing that these two are natural associates.

V. nodosa. Acaulescent, the rather ample foliage and

long peduncles from stout horizontal more or less branching and strongly knotted rootstocks: herbage light green, hirsutulous, the petioles and peduncles very strongly so and the hairs spreading or deflexed: leaves from round-reniform to round-ovate, obtuse, subserrate-crenate, about 2 inches wide at time of petaliferous flowering, the undeveloped ones cucullate, all much shorter than their petioles: peduncles equalling or exceeding the leaves, rather slender, bibracteolate near the middle, the pubescence rigid and retrorse: sepals lanceolate, puberulent, the margin more or less obscurely ciliolate: corolla pale-violet, $\frac{3}{4}$ inch broad; uppermost petals obovate, naked, the laterals with a dense tuft of apparently flattened and distinctly woolly hairs, the odd one as long as the others and broadly spatulate.

Near Syracuse, New York, communicated by Mr. Homer D. House. Related to such species as *V. cuspidata, V. Dicksonii* and *V. lætecærulea,* and remarkable for its large knotted and exactly horizontal rootstocks, the woolly-hairiness of its petals, and the retrorsely almost hispid peduncles.

NEW SPECIES OF CERASTIUM.

C. OREOPHILUM. Tufted stems 4 to 8 inches high, leafy with about 4 pairs of suberect leaves and ending in a sessile contracted cyme, the whole stem purple or purplish and glandular-pubescent with white spreading hairs: leaves lance-linear, acute, of half the length of the internodes or somewhat more, rather sparsely glandular-hirsutulous and almost equally so on both faces; basal sterile branches very short, consisting of little more than fascicles of obovate-oblong carinate-nerved at length almost glabrous leaves of

$\frac{1}{4}$ to $\frac{1}{2}$ inch long: calyx $2\frac{1}{2}$ lines long, the sepals very acute, the outer scarious at tip, the inner with broad scarious margin as well as tip, all more or less strigose-pubescent and distinctly 1-nerved: corolla rather large, twice the length of the calyx or more: capsule not seen.

Foothills of the Rocky Mountains near Fort Collins, Colorado, 7 May, 1896, C. F. Baker; species with very characteristic calyx.

C. EFFUSUM. Slender stems loosely tufted, ascending, 8 to 10 inches long, the rather ample cyme short-peduncled: leaves of main stem $\frac{3}{4}$ inch long or less, $1\frac{1}{2}$ lines wide below the middle, minutely glandular-hirtellous above, glabrous beneath, even as to the prominent midvein, those of the sterile shoots an inch long, narrowly spatulate-linear, glandular-hirtellous above, sparingly so beneath, but midvein almost or altogether glabrous; pubescence of stems and pedicels more strong and more notably glandular: calyx 2 lines long, the sepals very acute, obviously 1-nerved, sometimes with traces of two other nerves, the pubescence short, gland-tipped and spreading: petals large, of rather more than twice the length of the sepals: capsule straight, seldom surpassing the calyx by half the length of its teeth.

The typical material of this is of my own collecting in wild grassy pasture land along Dale Creek, Wyoming, 1 July, 1896. While manifestly allied to *C. angustatum*, it differs very markedly by its more slender habit, glandular pubescence, and short straight capsule.

C. SCOPULORUM. Loosely tufted perennial, the main stems 4 to 8 inches long, bearing 2 or 3 remote pairs of linear lanceolate leaves and a contracted few-flowered cyme, the leaves almost glabrous above, but with scattered small

bristly hairs on the midvein beneath and on the margin; leaves of the long and well developed sterile shoots linear, hirsute-ciliate at the base, otherwise glabrous, nearly $\frac{3}{4}$ inch long, longer than the internodes and spreading; all the stems and branches more or less hirsutulous below the nodes, often hirtellous nearly throughout, only the peduncles and pedicels glandular-hirtellous: calyx $2\frac{1}{2}$ lines long, almost glabrous, showing only a few scattered and very short gland-tipped hairs: corolla large, of more than twice the length of the calyx: capsule very short, not even the relatively very long teeth exserted from the mature calyx.

Rocky Mountains of Colorado, southward chiefly, and at considerable elevations only; well represented in Baker, Earle and Tracy's nn. 497, 664 and 892, all from subalpine stations in the La Plata Mts.; the species perhaps also embracing Mr. Wooton's n. 639 from the White Mountains, southern New Mexico.

C. OCCIDENTALE. The many flowering stems usually decumbent, 5 to 8 inches high, bearing about 3 pairs of leaves and all the internodes elongated, the cyme short and mostly contracted, 5- to 15-flowered (in more reduced forms 3-flowered or even 1-flowered); leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, oblong-linear, acutish, ascending, from hirtellous-pubescent, with minute subsessile glands interspersed, to nearly glabrous, the stem more notably pubescent with somewhat deflexed hairs, but peduncles and pedicels distinctly viscid-hirtellous; sterile basal shoots numerous, 2 inches long or more (in reduced forms less than 1 inch), their narrowly spatulate-linear leaves $\frac{3}{4}$ inch long, far surpassing the internodes: sepals $2\frac{1}{2}$ lines long, scarious at the acute tips and more or less so marginally, the back viscid-puberulent and only faintly 1-nerved: petals twice the length of the sepals:

capsule about twice as long as the calyx, distinctly curved upwards.

A common plant of the Colorado Rocky Mountains at all elevations of from 7,000 to 11,500 feet, and quite variable as to the degree of the pubescence. The best specimens are partly my own, from Bear Creek, west of Denver, collected in July, 1889, along with others equally complete, obtained by Mr. Holm partly about Gray's Peak, and partly at similar elevations near Leadville, in 1899. Reduced forms are common on the plains of Wyoming and Montana, and have been distributed by Nelson, Rydberg and others.

C. ANGUSTATUM. Tufted perennial, the ascending flowering stems often a foot high, ending in a long-peduncled rather contracted cyme, producing from their lower nodes upright densely leafy sterile branches 6 inches high: leaves of main stem 1 inch long, half as long as the internodes, lance-linear, 1½ lines wide below the middle, hirtellous, especially on the strong midvein beneath and on the margin, those of sterile shoots as long or even longer, very narrowly linear, subfalcate, acute, of twice or thrice the length of the internodes, pubescence of this is also of the stem hirsutulous, not glandular: calyx about 2 lines long, the somewhat appressed-villous sepals acute; corolla also small, but well surpassing the calyx: capsule short, not twice the length of the calyx, abruptly curved.

Near Prince Albert, Saskatchewan, July, 1896, John Macoun, Canad. Survey, n. 12,459. The type sheet is in my own herbarium. The corresponding one in that of the Canad. Surv. show even greater dimensions, but with the remarkable sterile branches themselves nearly a foot high, and less densely leafy, the leaves of barely twice the length of the internodes. The plant is said to inhabit sand hills on the open prairies of the region.

C. CAMPESTRE. Size and habit of *C. occidentale* but rather more leafy, the cymes more contracted and with more numerous flowers, but stem canescently villous below, the dense indument strongly deflexed, the upper portion and the pedicels with a much less dense and a spreading villosity of hairs mostly gland-tipped and very viscid: leaves ¾ inch long, subulate-lanceolate, strongly ascending, rather densely appressed-villous on both faces: sepals very acute, hardly scarious except at the very apex, appressed-pubescent, not viscid, 1-nerved: corolla large, the broad bifid petals of nearly thrice the length of the sepals.

Apparently frequent on the high prairies of British America, when it takes the place of the more southerly *C. occidentale*, from which its strong villous pubescence and some other characters well distinguish it. Numbers 5,599 (Cypress Hills, N. W. T.), 4,600 (Indian Head, Assiniboia) and 12,450 (Stonewall, Manitoba), of the Canad. Survey, are sheets that perfectly represent the species.

C. VESTITUM. Loosely tufted slender stems decumbent, often geniculate, 4 to 7 inches high, their leaves short and in few pairs, the lowest oblong, others oblong-linear, the upper rather broadly lanceolate, less than ½ inch long (the internodes 1 to 2½ inches), acutish, ascending or at length spreading, rather densely somewhat villous-pubescent on both faces; stem densely and retrorsely white-villous, the peduncles and pedicels with a similar though spreading indument intermixed with shorter gland-tipped hairs; crowded leaves of the short spreading sterile shoots elliptic-lanceolate to linear-lanceolate, ¼ to ½ inch long, more sparingly villous, when very old glabrate: sepals 2 lines long, rather broad, abruptly acutish, glandular-puberulent and viscid, wholly herbaceous, or scarious at tip: petals thrice the length of the sepals: capsule not exserted.

Dry banks at St. Anne, near Edmonton, Alberta, collected by Mr. W. Spreadborough, 9 June, 1898; n. 19,285 of the Canad. Geol. Surv. Species uncommonly well marked and not otherwise known.

C. CONFERTUM. Stems purplish, 6 to 10 inches high, hirtellous (under a lens) and most of the hairs gland-tipped: leaves in about 4 or 5 pairs, shore and remote, oblong-lanceolate, obtusish, ascending, the longest little more than ½ inch long, all pubescent on both faces, scarcely glandular: cymes rather many-flowered but condensed, the whole scarcely an inch long except in age: sepals less than 2 lines long, oblong-ovate, obtuse at the abruptly scarious-tipped and purplish apex, the body strongly glandular-puberulent and strongly 1 to 3-nerved: corolla small, but well surpassing the calyx.

An excellent species, of which the only specimens seen, were collected at Stewarts Lake, British Columbia, 20 June, 1875, by Mr. John Macoun, and on Telegraph Trail, in the same region, the same year, 24 June.

C. PATULUM. Cæspitose and low, the many flowering stems seldom exceeding 3 or 4 inches, decumbent, clothed with about 4 pairs of leaves and ending in a peduncled cyme of about 3 flowers: leaves subulate-lanceolate, scarcely ½ inch long, spreading, pilose-pubescent above when young and somewhat bristly-ciliate at base, in age glabrate; those of the sterile shoots narrower, not much crowded though exceeding the short internodes: leafy part of main stem retrorsely villous-pubescent, the peduncle glandular-hirtellous and quite viscid: bracts of the cyme broad and of oval outline: sepals 2 lines long, very broad, obtusish, scantily strigulose and strongly 3-nerved: petals large, obcordate: capsule little surpassing the calyx.

Common on stony hills about San Francisco and elsewhere in middle California near the sea, being the *C. arvense* of my Bay-Region Manual, etc., but a most distinct species.

C. Sonnei. Of twice the height of the last, and more slender, the cyme ampler, often 5-flowered: leaves oblong-lanceolate, $\frac{3}{4}$ inch long, glandular-puberulent, along margin and on the midvein beneath glandular-hirtellous; those of the sterile shoots narrower, otherwise similar: bracts of the cyme broad, almost ovate, acute: pubescence of stem very short, spreading, glandular: sepals 2 lines long, elliptic-oblong, acute, lightly 1-nerved, with or without traces of lateral nerves, glandular-puberulent, more so marginally than superficially: petals deeply obcordate, twice as long as the sepals.

Subalpine in the Californian Sierras, my specimens from an altitude of 8,000 feet on Mt. Rose, 22 July, 1888, C. F. Sonne.

C. adsurgens. Apparently biennial, with many decumbent or assurgent branches forming a tuft on the crown of the slender root, these a foot long more or less, simple up to the long and narrow cyme, herbage altogether light-green, scarcely glandular or viscid, minutely rough-pubescent (under a lens appearing hispidulous): leaves $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, oblong-linear, obtuse: calyx scarcely 2 lines long, the sepals oblong, acute, hirtellous with scattered bristly hairs, not viscid, marked at base with a prominent but short rudiment of a midvein: petals not quite equalling the sepals, their segments very acute: capsule of nearly thrice the length of the calyx, gradually curved.

Collected by the writer on wooded slopes of the San Francisco Mountains, northern Arizona, 10 July, 1889.

C. fastigiatum. Of similar dimensions, and with the

same light-green herbage as the last, the root annual or biennial, but never branched from the base, all the branches axillary to leaves of the stem above the base, and all ascending or suberect: leaves 1 to $1\frac{1}{2}$ inches long, lance-linear, acute, strongly glandular-hirtellous; branches of the cyme more divergent and more regularly dichotomous: sepals hispidulous under a lens, not glandular, veinless: corolla much exceeding the calyx and the lobes of the petals not acute: capsule of about twice the length of the calyx or something more, rather strongly curved.

Mountains of southern New Mexico and perhaps adjacent Arizona; my specimens being from the Pinos Altos Mountains, collected in 1880, and distributed for *C. nutans.*

Five New Species of Rumex.

R. gracilipes. Tall and rather slender, 3 or 4 feet high: leaves about 7 inches long and 3 in breadth, of elongated deltoid-ovate outline, sub-cordate at base, entire, acutish, plane, rather conspicuously feather-veined, the petioles very slender, a foot long: panicle a foot long or more, dense, leafless, or with one or two narrow leaves at base: pedicels filiform, 2 or 3 lines long, obscurely jointed at base: valves grainless, rather small, firm and opaque, 2 lines long, round-ovate, abruptly acute, rather finely and evenly reticulate, the margin erose.

Moist meadows at the Pine Creek Hay Ranch, above Palisade, Nevada, collected by the writer, 25 July, 1896. Very well marked by its broad and short leaf-blades on very long and slender petioles.

R. POLYRRHIZUS. Only sparingly leafy, rather slender, 2 or 3 feet high, the solitary stem from a rather superficially seated fascicle of several or many fleshy roots: leaves all of narrowly lanceolate or linear-lanceolate outline, mostly 6 to 8 inches long, on petioles of equal length or shorter, all plane or else somewhat crisped toward the base: panicle long and loose but strict, more or less leafy-bracted: pedicels rather distinctly subclavate, jointed well above the base: valves thin, deltoid-ovate, venulose but scarcely much reticulate, the margins dentate.

Species of dry land habitat mostly along the borders of aspen thickets, in southern Wyoming and adjacent Colorado, distinguished from all other western species by its fascicle of numerous somewhat radiating roots seated near the surface of the ground. The specimens before me are those collected by myself near Sherman, Wyoming, July, 1893, and a very good fruiting one by Mr. Osterhout from Lone Pine Creek, Larimer Co., Colo., 22 Aug., 1900. In segregating his *R. densiflorus* Mr. Osterhout seems to have taken the present plant for the true *R. occidentalis*, but it is quite as distinct from that as is the other Rocky Mountain species; even more so.

R. PROCERUS. Very large, the stems often 6 or 8 feet high and the lowest leaves 1½ feet long exclusive of the equally elongated petiole; the blade linear-lanceolate, subcordate, acutish, the margin inclined to be very full and wavy or plicate-undulate: panicle often 2 or 3 feet long, rather loose, or sometimes more dense, naked or leafy-bracted: pedicels ½ inch long, filiform below, abruptly thickened under the calyx, jointed below the middle; valves about 3 lines long and as broad, subcordate-orbicular, very obtuse, thinnish and reddish in maturity, but

rather strongly reticulate, and the whole surface closely impressed-puncticulate.

This is what has been called *R. occidentalis* in the western middle sections of California; a plant by no means common there, and confined to wet, boggy depressions among the coast hills about San Francisco Bay and Monterey. It is an almost gigantic species and very early flowering; being in mature fruit before the end of May.

R. CONFINIS. Stems as stout and foliage as large as in the last, the panicle ample, less elongated: leaves even more ample, commonly 6 inches wide toward the deeply subhastate-cordate base: pedicels slender, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, jointed well above the base: valves suborbicular, with subtruncate base, green and of thin texture, with a not much raised but very distinctly and completely reticulated venation, the margin more or less crenate or dentate toward the base.

Common in the lake region of northern Idaho, inhabiting wet meadows; fruiting in July and August. Leiberg, n. 562, and Heller, 3481, as these are represented in my herbarium.

R. FENESTRATUS. Stem not known; plant probably not as tall as in the two last; the single radical leaf seen lanceolate, plane, 6 inches long and subcordate, on a petiole of greater length; pedicels slender, the articulation not obvious: valves large, thin and translucent, commonly much reddened in maturity, of acutish deltoid-ovate outline, but longer than broad, conspicuously and variously reticulate, and, as seen from within, exhibiting a minute but very distinct favose secondary (or primary?) reticulation.

Near Comax, Vancouver Island, 23 June, 1893, John Macoun; n. 1570 of Canad. Geol. Survey.

CORRECTIONS IN NOMENCLATURE.—IV.

TRIFOLIUM PETRÆUM will be a suitable name for Mr. Rydberg's *T. lilacinum*, Bull. Torr. Club, xxviii. 37 (1901), which is invalidated by *T. lilacinum*, Greene, Proc. Philad. Acad. for 1895, p. 547 (1896).

CARDAMINE INFAUSTA. *C. cardiophylla*, Rydb. l. c. 280 (1901), in conflict with *C. cardiophylla*, Greene, Fl. Fr. 266 (1891.)

VIOLA OREOPHILA is a name offered instead of the *V. monticola* of Rydb. Fl. Mont. 264, there being a *V. monticola*, Jordan, Obs. ii. 37 (1846).

SENECIO ANACLETUS. *S. Toluccanus* var. *microdontus*, Gray, Syn. Fl. i., part 2, p. 388 (1884). This elegant subalpine *Senecio*, of frequent occurrence from Colorado southward into Mexico, has already been recognized as a species by Mr. Heller, according to whom it is to be called *S. microdontus*. But that can not be. There is an *S. microdontus* of Madagascar, published by Baker in 1881, not to speak of a still earlier employment of that adjective by Weddell, for a South American member of the genus.

STUDIES IN THE CRUCIFERÆ.—IV.

1. *New Species of* LESQUERELLA.

L. PRUINOSA. Perennial, the crown of the root not branched, supporting a single tuft of leaves with decumbent scapiform peduncles in their axils: blade of the leaf

an inch long or more, as broad as long, mostly indefinitely quadrate rather than rounded, otherwise of more rounded outline and repand-toothed, pale (but not silvery), with a minute and not dense stellate-lepidote indument; petioles about twice the length of the blades and, together with the peduncles, purplish, pruinose with small and not closely contiguous stellate scales: peduncles and short racemes not greatly surpassing the foliage even in fruit, leafy below with obovate entire petiolate leaves or bracts: flowers small for the plant, sulphur-yellow: fruiting pedicels ascending: pods oval, glabrous, 3 lines long or more, surmounted by a style nearly as long.

Known in but a single but very excellent specimen obtained by Mr. C. F. Baker, at Pagosa Springs, Colorado, 21 July, 1899.

L. OVATA. Perennial, the caudex multicipitous, its branches bearing tufted leaves and several short leafy-bracted rather few-flowered peduncles, the whole plant, petals and pods excepted, white with a very dense stellate-lepidote indument: blades of lower leaves round-ovate to oval, acutish, entire, firm, about ½ inch long, on petioles as long; scapes erect, only 2 or 3 inches high, their bracts oblanceolate: pedicels of the short and subcorymbose fruiting raceme stout, ascending: pods glabrous, subglobose, substipitate, about 3 lines in diameter, the style as long.

Bluffs of the Arkansas, about Pueblo, Colorado, collected by the writer in May and June, 1873, in flower and fruit; also from Swallows', above Pueblo, 1 June, 1901, C. F. Baker, n. 8.

L. PARVULA. Dwarf alpine multicipitous perennial, the branched lignescent and quite subterranean caudex 1½

inches high, the peduncles seldom 2 inches: leaves all narrowly linear, erect, an inch long, entire, silvery-stellate-lepidote, this indument more definitely stellate on the pedicels and small ovate pods: styles rather longer than the pods.

Summit of Mt. Bross, Middle Park, Colorado, 29 July, 1876, H. N. Patterson; the specimens distributed under the name *Vesicaria alpina*, from which the species differs essentially in its mode of growth by strong lignescent subterranean caudex and its invariably long narrow foliage. In true *L. alpina* there is no such underground growth, and the lowest leaves are oblanceolate, or even broader. It is a species of the Montana region, nowhere, I think, approaching even the borders of Colorado.

L. DIVERSIFOLIA. Small and rather slender perennial, caudex simple or with 2 or 3 short branches: tufted leaves small, all on rather slender petioles longer than the blade, this from round-ovate to ovate-hastate, rhombic-ovate and ovate-lanceolate, seldom ½ inch long, both faces canescently lepidote: racemose peduncles 2 to 4 inches long, decumbent or assurgent, floriferous at summit, below it conspicuously leafy-bracted, the bracts oblanceolate: calyx and ovaries lepidote; pods not seen.

An exceedingly well marked species, as to habit, foliage, etc., distributed by Mr. Cusick (n. 2,304 of my set), from an altitude of 7,000 feet in the Wallowa Mts., eastern Oregon, 5 Aug., 1899.

L. NODOSA. Caudex mostly simple, elongated and with short fusiform nodes marking the growths of successive years; herbage silvery-lepidote even to the pods: leaves oblanceolate, acute, entire, of firm texture, ¾ to 1½ inches

long; racemose peduncles about 2 inches long; pedicels slender, spreading or deflexed, about twice the length of the ovate pods, these about 2 lines long, little compressed, surmounted by a style 1 line long or more.

Milk River, Assiniboia, 13 July, 1895, Mr. John Macoun; distributed (n. 10,313) as *L. alpina*, which it resembles only as to its pods, being by other characters extremely different.

L. VERSICOLOR. Evidently perennial, but root slender and branching and no true caudex manifest; basal leaves few and small, oval to oblanceolate on slender petioles, the blade entire or toothed; peduncles slender, decumbent, often a foot long, oblanceolate leaves clothing the lower portion, the raceme in fruit long and lax; pubescence merely stellate and not dense: petals sulphur-yellow changing to pink: spreading pedicels slender, ¾ inch long; pods small, globose, little more than a line in diameter, stellate-tomentose, the slender style fully 2 lines long.

Stony Mountain, Manitoba, 4 June, 1896, Mr. Macoun. The specimens were distributed (n. 12,401) for *L. Ludoviciana*, the pods being globose, and the pubescence stellate; but the plant is widely removed from that species in habit, foliage, etc., much more nearly resembling certain species of the Mexican border in aspect, not to speak of the changeable color of the corolla, in which point, as well as in some others, it recalls *L. purpurea*.

L. MACOUNII. Perennial, the stout root surmounted by an ample rosette of foliage and several decumbent peduncles, these 3 to 5 inches long and in fruit loosely racemose from toward the base: leaves canescently lepidote-stellate on both faces, 1½ to 2 inches long, the stout petioles and oval

to elliptical repand-dentate blades of about equal length: the recurved pedicels and also the pods stellate-tomentose, the latter globose, 1½ lines in diameter, the style somewhat longer: petals pale-yellow.

Collected by Mr. John Macoun, at Medicine Hat, Assiniboia, 9 Aug., 1895, and distributed (n. 10,308) as *L. Ludoviciana*, but resembling that species only as to fruit; in habit and foliage extremely different.

L. ROSEA. Very slender and small, the whole plant above ground barely 2 inches high, the foliage almost white with a dense but scarcely more than stellate indument, the slender peduncles, pedicels, calyx and pods more sparsely stellate: caudex very short, simple in younger plants, perhaps branched in older ones: basal leaves with short ovate or ovate-lanceolate, acute entire blade shorter than the petiole, the whole leaf seldom ½ inch long: peduncles with a a few oblanceolate sessile leaves and a short few-flowered raceme: petals well exceeding the sepals, rose-purple: globose pods less than a line broad, the slender style rather longer.

Old Wives' Creek, Assiniboia, 2 June, 1895, Mr. Macoun (n. 10,309). The smallest species of the genus.

2. *Miscellaneous New Species.*

THYSANOCARPUS AFFINIS. Very erect, 1 to 1½ feet high, simple below, parted above the middle into several suberect racemose branches; herbage glabrous, glaucous: lowest leaves not seen, the larger cauline 3 inches long, of narrow-lanceolate outline, with several pairs of very prominent subulate or often falcate-incurved teeth, the base slightly auricled, those of the flowering branches lance-linear, very saliently denticulate: petals very small, not exceeding the

sepals, but stamens well exserted: silicles of strongly pyriform outline, small, unevenly crenate, never perforate, the scarious margin very narrow or obsolete, the whole body of silicle hirtellous.

Santa Catalina Island, California, March, 1901, Blanche Trask. The species has the foliage of *T. ramosus* of the same island and of others of the group, but in mode of growth this plant is at the opposite extreme, while the charters of the pods are very distinctive.

Lepidium glaucum. Winter annual, erect, 3 to 6 inches high, fastigiately branched from below the middle of the stem, each branch ending in a slender raceme; herbage very glaucous, glabrous except as to pinnate basal leaves, these minutely pubescent, their rather remote pinnæ incised: flowers very small, both calyx and corolla white; stamens apparently 4: pods nearly orbicular, about $\frac{3}{4}$ line broad emarginate, not margined, glabrous and obscurely lineolate, their slender ascending pedicels about $1\frac{1}{2}$ or 2 lines long.

In clayey soil about Mesilla Park, New Mexico, March, 1900, Theo. D. H. Cockerell.

Draba Albertina. Apparently annual or biennial, the tuft of radical leaves single, surmounting a slender taproot; flowering stems, many and of equal length, 3 to 6 inches high, loosely racemose from near the base and naked or with a single oblong entire leaf near the base: crowded basal leaves less than an inch long, spatulate-linear or -oblong, entire very sparingly beset with short, simple or forked hairs or even wholly glabrous except as to the setose-ciliate margin: base of stems with scattered simple hairs, inflorescence glabrous: pods elliptic-oblong, seldom $\frac{1}{4}$ inch long, on ascending pedicels of about equal length or longer: style none.

Crow's Nest Pass, Alberta, August, 1897, Mr. John Macoun, being n. 18,122 of the Canadian Geol. Surv. collection. Also in flower only (showing pale-yellow flowers, with glabrous calyx), by the same, from Elbow River, in the same region, n. 18,123; both distributed as "*D. stenoloba*," an Alaskan perennial to which such plants as these sustain no near affinity.

DRABA DICTYOTA. Annual, a foot high, rather freely branching from near the base, the branches ascending, lowest leaves oblong-lanceolate, an inch long or more, nearly or quite entire, pubescent on both faces with loose dendritic rather than stellate hairs, the cauline 5 or 6, lanceolate, serrate-toothed: leafy portion of stem villous with simple hairs and also minutely stellate, the rachis of the long loose raceme glabrous: flowers small, pale-yellow, the green sepals glabrous; petals obcordate-notched: pods about 4 lines long, narrowly oblong, glabrous, notably reticulate-venlose, the stigma nearly sessile.

At Calgary, Alberta, 7 June, 1897, Mr. John Macoun, n. 18,132 of Canad. Surv. Species akin to *D. nemorosa*, but with a branching habit, elongated leaves, and pods marked by a prominent reticulation of long narrow meshes.

DRABA OLIGANTHA. Perennial, slender, the subscapiform flowering stems 2 to 6 inches high: leaves mostly rosulate, ½ inch long or less, spatulate-oblong, rather thin, 1-nerved, entire, loosely pubescent with subsessile cruciform hairs, the 1 or 2 sessile cauline leaves oblong-lanceolate, occasionally toothed: flowers commonly 2 or 3, rarely 5 or 6, sometimes 1 only, white, the calyx glabrous, the rather long petals retuse or emarginate: pods ½ inch long, very narrow, tapering gradually from the middle and slighty falcate, glabrous, their spreading pedicels ½ inch long.

This exceedingly well marked perennial *Draba* is from the Alaska seaboard, and has been collected, in so far as I can discover, only by F. Funston, who obtained the specimens at Disenchantment Bay, 9 Aug., 1892. They were distributed for *D. stenoloba*, and the pods are even narrower than in that species; but the true *D. stenoloba* is a very different plant.

THELYPODIUM RHOMBOIDEUM. Biennial, very stout, a yard high or more, deep-green and glabrous, the stem solitary, corymbose-panicled at summit: basal leaves 4 to 10 inches long, short-petiolate, broad and of rhombic-lanceolate outline, obtuse, entire, those of the flowering branches only 2 inches long, linear, acute: flowers in short dense racemes, these in fruit lengthening to 5 or 6 inches, the erect sepals and more than twice longer spatulate-linear petals dull flesh-color or white: pods short for the plant, only an inch long, few-seeded and rather long-stipitate.

Collected by the writer, in the West Humboldt Mountains, Nevada, July, 1894, and allowed to pass for *T. integrifolium*, until now, when it is seen to be very distinct by its large rhombic-lanceolate leaves, elongated inflorescence, short few-seeded pods, etc.

THELYPODIUM AFFINE. Allied to the last, quite as large and stout, glabrous, glaucescent: radical leaves 5 to 10 inches long, spatulate-lanceolate, obtuse, denticulate, the blade decurvent as a narrow wing to near the base of the rather elongated petiole: stout corymbose panicle of few branches and nearly naked: flowering racemes dense, 1 to 1½ inches long, ¾ inch broad; sepals ascending, the spatulate petals twice as long: mature pods not seen, but young fruit-

ing racemes elongated and lax, and growing ovaries notably stipitate.

Described from specimens obtained by the writer in the mountains near Tehachapi, California, 22 June, 1889. It has also been permitted to pass for *T. integrifolium*, though seen to be remarkably distinct when compared with the original of that species, which is from the remote interior, toward the sources of the Columbia River.

New Species of Laciniaria.

L. VITTATA. Stem 2 feet high, from a narrow fibrous-coated tuberous root; herbage glabrous: leaves nearly all from below midway of the stem, lance-linear, ascending or suberect, the longest nearly a foot long, plane, the lowest and broadest channelled beneath between each pair of the five prominent elevated parallel veins: spike 4 to 7 inches long, on an almost naked (merely small-bracted) peduncle: heads subcylindric, only about 4 lines long, crowded; bracts of involucre about 20 and closely imbricated, oval to oblong or obovate-oblong, 5–7-striate up to near the rounded narrowly scarious-margined and erose-ciliolate tips: flowers 5 to 7: achenes hirsutulous; pappus subplumose.

Near Biloxi, Mississippi, 19 Sept., 1898, S. M. Tracy (n. 6350 of my set of Tracy's plants). This was distributed, by my advice, as *L. spicata*; but it is a most distinct species, allied to the northern *L. pycnostachya*. It is remarkable for its long ribbon-like glabrous channelled foliage.

L. SEROTINA. Rather slender, 2 feet high or less, the stem hirsute or almost tomentose with white more or less

curled hairs: lowest leaves few, narrowly lanceolate, petiolate, prominently 5-nerved, the lower cauline linear, 2 inches long, gradually diminishing to a series of subulate linear short bracts, all glabrous except a few scattered hairs on the lower face and chiefly along the midvein: spike loose: involucres cylindrical, 5-flowered, their bracts about 10 or 12, the lowest ovate, ciliate, the inner ones oblong, glabrous, 1-nerved, acutish and with little marginal scariousness: achenes pubescent with short appressed hairs; pappus barbellulate.

In low pine barrens at Covington, Louisiana, collected 8 Nov., 1885, by the late Rev. Fr. Langlois. Remarkable for its late flowering. The corms are destitute of the fibrous coating seen in those of other species.

L. Earlei. Rigidly erect, stoutish, 2 feet high or more, leafy to below the middle, thence narrowly and strictly racemose, the small campanulate heads 50 or more, herbage glabrous except for a few bristly marginal hairs at bases of some leaves, lightly punctate: leaves narrowly lanceolate and linear, rigid, spreading, or the larger lower ones ascending: heads about ⅓ inch high, on pedicels as long or longer; bracts many, appressed, with rounded not scarious but purple-margined and somewhat ciliolate tips: achenes rather strongly hirsute; pappus barbellate or subplumose.

Near Auburn, Ala., Sept., 1896, F. S. Earle. Certainly allied to *L. scariosa*, and remarkable for its small and very numerous heads forming a long strict raceme.

L. elegantula. Very slender, 1 to 2 feet high, leafy toward the base, bracteate from below the middle, loosely subspicate or racemose toward the summit: leaves narrowly lanceolate and with a broad petiole, the whole 3 to 6 inches

long, faintly punctate, glabrous except as to the woolly-ciliate petioles and some hirsute pubescence on the midvein beneath: bracts linear, ciliate, the lowest more than an inch long, the upper half as long: heads 6 to 12, sessile or pedicellate, turbinate, small; bracts few, appressed, with rounded obovate narrowly scarious-margined more or less ciliolate glabrous and strongly punctate tips: achenes small, strongly hirsutulous along the ribs; pappus fine; barbellulate-scabrous.

A slender and very elegant species allied to *L. scariosa*, found near Auburn, Alabama, by Prof. F. S. Earle, Oct. 18, 1896.

L. NERVATA. Stems 1½ to 2 feet high, leafy and leafy-bracted to the summit, with 3 to 10 subcylindric and subsessile heads in the axils of the uppermost bracts; herbage deep-green, scarcely punctate, seeming glabrous, a lens disclosing some short bristly hairs along the stem and on the leaves beneath: leaves linear, or the lower narrowly lance-linear, these often 8 or 10 inches long, with very prominent white midvein, 2 to 4 smaller but still prominent veins intervening between that and the callous margins, the upper leaves and bracts small, linear, 1-nerved: subcylindric heads subtended by several lanceolate strongly ciliate bracts, the proper bracts or scales of the involucre few, green, in no degree scarious or ciliate, their broadly ovate tips cuspidately acute, not striate: pappus not strongly plumose, though more than subplumose.

Monteer, Missouri, 2 Aug., 1889, B. F. Bush, distr. as *L. cylindrica* (n. 221). Said to grow in woods.

L. SCABRA. Stems stoutish, 2 feet high, loosely and rather slenderly spicate from above the middle, below

striate-angled and retrorsely scabro-pubescent: lower leaves 4 to 6 inches long including the short petiole, the blade oblong-lanceolate, punctate and scaberulous above, retrorsely scabrous beneath, the smaller and more copious middle leaves narow-lanceolate, sessile, scabrous as the others, and marginally strongly so: short-campanulate subsessile heads $\frac{1}{2}$ to $\frac{3}{4}$ inch long, their bracts rather few, densly scabrous, not punctate, their broad rounded tips encircled by a narrow entire ciliolate scarious margin: style-branches very long and slender: pappus subplumose.

Pine Hills, Illinois, 23 Sept., 1890, F. S. Earle.

L. ASPERA. *Liatris aspera,* Michx. Fl. ii. 92. Stoutish, 2 feet high, loosely spicate from about the middle: lowest leaves narrowly lanceolate, 4 to 6 inches long including the petiole, those above somewhat crowded, narrowly spatulate-lanceolate, obtuse, 2 or 3 inches long, all punctate and scabrous, the stem tomentulose-pubescent: heads 12 to 20, subsessile, subcampanulate, $\frac{1}{2}$ to $\frac{3}{4}$ inch high, their bracts glabrous, with rounded green and deeply punctate herbaceous tip which is more or less spreading, and encircled by a thin erose-dentate purple scarious margin: pappus subplumose.

Prairies of Illinois to Kansas and northward. I am not able to understand upon what principle a plant so well marked as this could be confused, as it has been, with *L. scariosa.*

NEW OR NOTEWORTHY SPECIES.—XXIX.

PENTSTEMON BAKERI. A large-flowered subalpine dwarf, the tallest plants barely 6 inches high, others less than half as large, the stoutish decumbent stems leafy at base and

subracemose from the middle, leaves oblong or obovate-oblong, 1 or 2 inches long, tapering to a petiole, obtuse, entire, rather firm in texture, glabrous, sparsely punctate, inflorescence glandular-puberulent: racemes of from 3 to 5 large flowers: sepals large, obovate, cuspidately acute, the margins scarious and lacerate-toothed: corolla red-purple, more than an inch long, with subcylindric tube and throat and not very strongly bilabiate limb, its lobes obovate-oblong: sterile filament hirtellous at and near the summit.

At 11,500 feet in the mountains about Pagosa Peak, southern Colorado, 6 Aug., 1899, C. F. Baker.

✓ ERIGERON SETULOSUS. Near *E. pumilus* and no larger but more pronouncedly multicipitous, with well developed and subligneous branched caudex, the branches notably leafy up to within an inch of the solitary head: leaves narrowly spatulate-lanceolate and canescent throughout, like the stem and peduncles, with short spreading stiff bristly hairs: bracts of the involucre sparingly setose-hispid; rays purplish or white: outer pappus conspicuous, of broadly linear and well elongated paleæ incisely toothed at summit.

Obtained at Aztec, New Mexico, 28 April, 1899, by C. F. Baker, and inadvertently referred by me, in Baker's distribution, to *E. concinnus*, from which it is now seen to be most distinct, being much more like *E. pumilus* as to size, and the monocephalous character of the branches, while by its distinct subligneous caudex it is equally remote from both these its allies.

✓ ERIOGONUM ARCUATUM. Near *E. flavum*, about as large, more extensively cæspitose, forming broad matted tufts: leaves oval, obtuse, an inch long or less, abruptly tapering to a rather slender petiole about as long, white-tomentose

beneath, pale-green and thinly tomentellous above: scapiform peduncles 6 inches high, bearing a single large sessile involucre and a pair of long-peduncled ones arising from its base, these opposite each other and curving upwards to the length of 1½ to 2 inches: involucres turbinate, nearly ½ inch high, silky-tomentose: perianths yellow, very sparsely silky-villous: stamens long-exserted.

On hillsides about Pagosa Springs, Colorado, 17 July, 1899. C. F. Baker.

Eriogonum anserinum. Near *E. dichotomum* and with quite similar white-tomentose foliage with slender twisted petioles; mode of growth the same, the inflorescence very different, being narrow and fastigiate, the involucres narrow and few-flowered: perianths greenish-yellow, smaller than *E. dichotomum*, not as broad at base, the outer segments retuse.

On hills about Goose Lake, Modoc Co., California, 27 June, 1895, Mrs. R. M. Austin.

NEW SPECIES OF MONARDELLA

M. MODOCENSIS. Perennial but scarcely suffrutescent, the several stems arising from an almost horizontal slender and not very ligneous rootstock, and seldom a foot high, purple, delicately puberulent: leaves rather dull-green but glabrous, ovate-lanceolate, entire, obtuse, an inch long or somewhat more, including the distinct short petiole, closely punctate below, not so above: heads 1 inch broad, the purple bracts from round-ovate and acute to oval and obtusish, puberulent, the margin short-ciliate: body of the calyx hirtellous, the short teeth stiffly hirsute: corollas red-purple.

Rather common in the mountain districts of northern California; here described from specimens taken by Mr. Milo S. Baker in Modoc Co., 1893. It was distributed by myself, from near Yreka in 1876, under n. 910, and Mr. Sonne obtained it near Verdi, Nevada.

M. GLAUCA. Stems many, 8 or 10 inches high, rather crowded on the short stout decumbent woody branches of the caudex: leaves oblong and oblong-lanceolate, entire, obtuse, only obscurely-nerved, glaucous (also very obscurely puberulent under a strong lens), copiously dotted, about $\frac{3}{4}$ inch long (the internodes scarcely longer), subsessile, the red-purple stems more distinctly puberulent: heads an inch broad: bracts long and narrow for the genus, varying from oblong-ovate to narrow-obovate, the veins almost parallel, the whole surface equally somewhat scabro-puberulent, the margin not strongly ciliate: short calyx-teeth not hirsute, scarcely more strigillose than the nerves below: corollas lilac-purple.

PITTONIA, Vol. IV. Pages 321, 322. Issued Nov. 7, 1901.

Deserts of eastern Oregon, W. C. Cusick, 21 June, 1898; distributed under n. 1956, for *M. adoratissima*, but very different, representing a strongly marked new species.

✓M. NERVOSA. Stems fewer from the stout woody base, taller, usually 12 to 18 inches high: leaves ovate- and oblong-lanceolate, obtuse, entire, prominently veiny beneath, plane above, about $\frac{3}{4}$ inch long, notably shorter than the internodes, hoary-tomentulose on both faces but most so beneath, only sparsely punctate: heads about 1 inch broad; bracts ovate-oblong, villous-tomentose and strongly woolly-ciliate: body of the calyx nearly glabrous, the teeth strongly villous-hirsute: corollas white.

Distributed by Sandberg & Leiberg from the arid region of eastern Washington in 1893, under the name of *M. adoratissima*, which is a plant of quite other characters.

INDEX.

New genera and species in **bold-face** type; synonyms in *italics*.

Abdra brachycarpa, 207
Abena, 103
Abesina, 104
Abronia
ammophila, 226
arenaria, 226
Achomanes
membranaceum, 104
Agoseris
monticola, 37
glauca, 37
Aldenella tenuifolia, 212
Alisma **brevipes**, 158
Allocarya
cognata, 235
orthocarpa, 235
Amelanchier
alnifolia, 129
Bakeri, 128
crenata, 127
Gormani, 129
pallida, 21
polycarpa, 127
prunifolia, 21
venulosa, 21
Androsace
arguta, 148
asprella, 150
capillaris, 148
diffusa, 150
filiformis, 148
Gormani, 149
pinetorum, 149
septentrionalis, 149, 150
Anecio, 103
Anemone pusilla, 49
Antennaria
alsinoides, 83
aprica, 82
arnoglossa, 83, 281
borealis, 85
confinis, 40
decipiens, 281
fallax, 281
foliacea, 284
Holmii, 81
media, 84
nardina, 82
nemoralis, 41
neodioica, 83
oxphylla, 284
plantaginifolia, 283
propinqua, 83
rosea, 81
solitaria, 281
sordida, 81
Arabis
Albertina, 196
arcuata, 192
arida, 190
campyloloba, 192
connexa, 197
consanguinea, 190
Drummondii, 197
duriuscula, 191
eremophila, 194
Fendleri, 194
formosa, 198
gracilenta, 194
gracilipes, 193

Arabis—*Continued.*
Holbœllii, 187
Lyallii, 196
maxima, 192
oxylobula, 195
oxyphylla, 196
platyloba, 198
platysperma, 198
recondita, 195
rectissima, 191
retrofracta, 188
rhodantha, 189
secunda, 189
subpinnatifida, 191
suffrutescens, 192
tenuis, 189

Aragalus
caudatus, 69
Richardsonii, 69

Argemone
platyceras, 68
sanguinea, 68
squarrosa, 68

Arnica
alpina, 167
arnoglossa, 166
attenuata, 170
betonicæfolia, 163
Bernardina, 170
chionophila, 171
Columbiana, 159
crocea, 159
diversifolia, 171
fulgens, 36, 37
grandifolia, 172
incana, 169
latifolia, 37
Lessingii, 167
lonchophylla, 164
macilenta, 161
Macounii, 160
Merriami, 36

Arnica—*Continued.*
multiflora, 162
ovalifolia, 168
ovata, 161
rivularis, 163
Rydbergii, 36
scaberrima, 165
subcordata, 173
teucriifolia, 164
tomentella, 166
tomentosa, 168
ventorum, 173

Aster
adsurgens, 216
alpigenus, 224
Andersonii, 224
armeriæfolius, 214
commutatus, 217
distichophyllus, 213
ensatus, 223
exsul, 221
fulcratus, 217
glastifolius, 218
Haydeni, 224
hesperius, 224
laetevirens, 219
limoniifolius, 222
limosus, 222
majusculus, 215
Menziesii, 223
Nelsonii, 219
oxylepis, 223
paniculatus, 224
pratincola, 215
proximus, 220
pulchellus, 224
spithamæus, 217
vallicola, 221
violaceus, 213

Atalanta serrulata, 210

Aquilegia **elegantula**, 14

Bidens
amplissima, 268

Bidens—*Continued.*
Beckii, 270
bullata, 268
cernua, 251
chrysanthemoides, 262
ciliolata, 256
Cusickii, 259
dentata, 269
elegans, 254
expansa, 266
formosa, 264
frondosa, 72, 247
glaucescens, 258
gracilenta, 255
hyperborea, 257
Kelloggii, 267
lævis, 262
leptomeria, 264
leptopoda, 260
lonchophylla, 258
lugens, 254
Macounii, 259
marginata, 262
melanocarpa, 247
Nashii, 267
Parryi, 265
persicæfolia, 266
platycephala, 261
prionophylla, 256
riparia, 261
succisœfolia, 245
tripartita, 243
vulgata, 72, 247
Berteroa incana, 204
Blairia nodiflora, 47
Brickellia
oblongifolia, 125
oliganthes, 125
Cæsalpinus, founder of the genus Bidens, 243
Caltha
biflora, 74, 75
chelidonii, 78
Caltha—*Continued.*
chionophila, 80
confinis, 76
Howellii, 79
leptosepala, 77
Macounii, 77
malvacea, 75
rotundifolia, 80
Campanula
aurita, 39
Wilkinsiana, 38
Cannabina, 243
Cardamine
Breweri, 201, 202
cardiophylla, 307
foliacea, 201
hederæfolia, 202
infausta, 307
Modocensis, 203
orbicularis, 202
Carsonia sparsifolia, 212
Caryophyllata
Camtschatica, 49
Cassia
Æschinomene, 32
angustissima, 30
bifoliolata, 31
brevifolia, 30
brevipes, 31
calycioides, 32
capensis, 30
chamæcrista, 29
chamæcristoides, 29
cuneata, 31
depressa, 29
diphylla, 28
flexuosa, 27
glandulosa, 29
hecatophylla, 32
lanceolata, 31
lineata, 31
mimosoides, 27

Cassia—*Continued.*
nigricans, 30
patellaria, 32
Persoonii, 31
pilosa, 28
procumbens, 28
rotundifolia, 31
serpens, 29
virgata, 31

Castilleia
angustifolia, 2
candens, 2
confusa, 1
Haydeni, 1
linariæfolia, 2
lineata, 151
miniata, 1
pallida, 1
remota, 2
subinclusa, 2

Celome sparsifolia, 212

Cerastium
adsurgens, 303
angustatum, 300
campestre, 301
confertum, 302
effusum, 298
fastigiatum, 303
occidentale, 299
oreophilum, 297
patulum, 302
scopulorum, 298
Sonnei, 303
vestitum, 301

Chænactis
macrantha, 98
pedicularia, 98
Xantiana, 98

Chamæcrista
Æschinomene, 32
angustissima, 30
bifoliolata, 31

Chamæcrista—*Continued.*
brevifolia, 30
brevipes, 31
calycioides, 32
capensis, 30
chamæcristoides, 29
cuneata, 31
depressa, 29
diphylla, 28
flexuosa, 27
glandulosa, 29
hecatophylla, 32
lineata, 31
mimosoides, 27
nictitans, 29
nigricans, 30
patellaria, 32
pavonis, 29
Persoonii, 31
pilosa, 28
plumosa, 27
procumbens, 28
rotundifolia, 31
serpens, 29
stricta, 27
virgata, 31

Cheiranthus
aridus, 198
Bakeri, 235

Chenopodium
spinosum, 225

Chrysopsis
Bakeri, 153
hirsutissima, 153
hispida, 154
pedunculata, 154

Chrysothamnus
Arizonicus, 42
Bakeri, 152
formosus, 41
gnaphalodes, 42
Greenei, 153

Chrysothamnus—*Continued.*
latisquameus, 42
Plattensis, 42
Clematis
Bakeri, 147
Douglasii, 147
hirsutissima, 147
Scottii, 147
Cleome
inornata, 16, 212
lutea, 210
platycarpa, 211
serrulata, 210
sparsifolia, 212
tenuifolia, 212
Coleosanthus
abbreviatus, 125
ambigens, 237
densus, 126
Fendleri, 237
floribundus, 237.
gracilipes, 237
grandiflorus, 237, 238
humilis, 124
modestus, 236
nepetæfolius, 237
oblongifolius, 125
polyanthemus, 126
populifolius, 238
umbellatus, 238
verbenaceus, 125
Conoclinium
flaccidum, 274
nepetæfolium, 274
venulosum, 273
Coreopsis
angustata, 239
Bidens, 244
lanceolata, 245
perfoliata, 263
Cryptocalyx
nepetæfolia, 48
Cyrtorhynca
neglecta, 146
Dieteria
divaricata, 23
pulverulenta, 23
viscosa, 22
Draba
Albertina, 312
brachycarpa, 207
Caroliniana, 204
cuneifolia, 201
deflexa, 20
dictyota, 313
Helleriana, 17
integrifolia, 201
luteola, 19
nemorosa, 313
Neo-Mexicana, 19
oligantha, 313
petrophila, 17
pinetorum, 18
spectabilis, 19
stenoloba, 313, 314
streptocarpa, 17
stylosa, 17, 18, 19
verna, 205
Dryas
anemonoides, 49
pentapetala, 49
Echinospermum
Fremontii, 96
Redowskii, 97
Texanum, 94
Eremosemium
Brandegei, 225
spinosum, 225
Erigeron
accedens, 155
compositus, 156
divergens, 155
Gormani, 156

Erigeron—*Continued.*
purpuratus, 155
setulosus, 319

Eriogonum
anserinum, 320
arcuatum, 319
dichotomum, 320
flavum, 319

Erophila verna, 204

Eucephalus
formosus, 156
glaucus, 157
Macounii, 70

Eupatorium
aboriginum, 277
ageratoides, 275, 278
angustatum, 277
Arizonicum, 280
aromaticum, 275, 279
cannabinum, 243
ceanothifolium, 275
cordatum, 275
eurybiæfolium, 275
Fraseri, 275
nemorale, 278
odoratum, 275
Tracyi, 278
urticæfolium, 275
viburnifolium, 276

Frasera
ampla, 186
macrophylla, 186
speciosa, 186
venosa, 185

Gentiana
bracteosa, 180
distegia, 182
heterosepala, 183
interrupta, 182
Parryi, 181
remota, 182

Gerardia
decemloba, 51
Holmiana, 52
lanceolata, 101
tenuifolia, 52, 101

Geum
anemonoides, 49
Aucklandicum, 225
ciliatum, 50
glaciale, 49
Rossii, 49
rotundifolium, 50
scopulorum, 148
sericeum, 50, 225
strictum, 148
triflorum, 50
turbinatum, 50

Gnaphalium
plantaginifolium, 280

Grayia
Brandegei, 225
polygaloides, 225

Greggia
camporum, 225
linearifolia, 225

Grimaldia, 26

Grindelia
oxylepis, 42
stylosa, 51
subincisa, 154

Gutierrezia
Californica, 58
divergens, 58
diversifolia, 53
euthamiæ, 53
fasciculata, 56
filifolia, 55
glomerella, 54
juncea, 56
lepidota, 57
linearifolia, 58
longifolia, 54

Gutierrezia—*Continued.*
lucida, 55
microcephala, 54, 55
serotina, 57
sphærocephala, 57
tenuis, 55
Gymosperma corymbosum, 54
Halerpestes
cymbalaria, 208
salsuginosa, 208
tridentata, 208
Hedysarum
marginatum, 138
Helianthus lævis, name should be ignored, 263
Hieracium
Greenei, 226
Greenii, 226
Traillii, 226
Hymenopappus
filifolius, 43
lugens, 43
luteus, 43
Laciniaria
aspera, 318
Earlei, 316
elegantula, 316
nervata, 317
scabra, 317
serotina, 315
spicata, 315
vittata, 315
Lactuca
campestris, 37
Morssii, 38
Lantana, 46
Lappula
cenchroides, 96
collina, 96
desertorum, 95
Fremontii, 96
Lappula—*Continued.*
heterosperma, 94
montana, 96
occidentalis, 97
Redowskii, 97
Texana, 94
Lepidium
glaucum, 312
Draba, 203
Lesquerella
alpina, 309
diversifolia, 309
Ludoviciana, 310
Macounii, 310
nodosa, 309
ovata, 308
parvula, 308
pruinosa, 307
purpurea, 310
rosea, 311
valida, 68
Leucelene
alsinoides, 99
Liatris aspera, 318
Lippia
betulæfolia, 48
canescens, 48
cuneifolia, 47
lanceolata, 47
nodiflora, 47
queretanensis, 47
reptans, 47
Lithospermum
albicans, 91
angustifolium, 91, 92
ciliolatum, 92
oblongum, 92
Lupinus
aduncus, 132
alsophilus, 135
ammophilus, 136
Bakeri, 132

Lupinus—*Continued.*
decumbens, 133, 135
Helleri, 134
ingratus, 133
myrianthus, 134
Neo-Mexicanus, 133
oreophilus, 135
Sitgreavesii, 133
Machæranthera
commixta, 71
divaricata, 23
inornata, 24
lætevirens, 23
montana, 22, 24
mucronata, 72
oxylepis, 25
Parthenium, 99
Pattersonii, 72
pruinosa, 157
pulverulenta, 23
rigida, 25
subalpina, 23
tagetina, 71
tephrodes, 24
varians, 98
viscosa, 22
Megalodonta
Beckii, 271
nudata, 271
remota, 271
Mertensia
Bakeri, 90
brachyloba, 90
ciliata, 86
Fendleri, 86
Franciscana, 86
fusiformis, 89
lanceolata, 90
oblongifolia, 90
paniculata, 86
pilosa, 88
platyphylla, 89
polyphylla, 87
Mertensia—*Continued.*
pratensis, 86
punctata, 88
Sibirica, 89
stomatechioides, 86
strigosa, 88
subcordata, 89
Monardella
Modocensis, 321
glauca, 321
nervosa, 322
Necker, genius of, and peculiar terminology, 103
Nerisyrenia
camporum, 225
linearifolia, 225
Œtosis
elongata, 106
ensiformis, 106
filiformis, 106
isoetifolia, 106
lineata, 106
zosteræfolia, 106
Onopteris, 107
Oreastrum elatum, 224
Oreocarya
Bakeri, 92
lutescens, 93
Oreostemma
alpigenum, 224
Andersonii, 224
elatum, 224
Haydeni, 224
Orthocarpus
cuspidatus, 101
imbricatus, 101
pachystachyus, 101
Oxytropis splendens, 69
Pentstemon **Bakeri**, 318

Peritoma
aureum, 210
inornatum, 210
luteum, 210
serrulatum, 210
Petrocallis Pyrenaica, 204
Phacelia frigida, 39
Phyla
betulæfolia, 48
canescens, 48
Chinensis, 47
cuneifolia, 47
lanceolata, 47
nodiflora, 46
reptans, 47
Phyllitis lineata, 106
Physalis
polyphylla, 150
Virginiana, 151
Piarimula Chinensis, 47
Platonia nudiflora, 47
Polanisia tenuifolia, 212
Polemonium luteum, 100
Pteris lineata, 106
Pulmonaria
ciliata, 86
pilosa, 88
Pyrola
pallida, 39
picta, 38
Pyrus occidentalis, 131
Ranunculus
acriformis, 16
alismellus, 143
apricus, 145
arnoglossus, 143
Bongardi, 16
cardiophyllus, 144
Earlei, 15
eremogenes, 144
Ranunculus—*Continued.*
Eschschotzii, 15
fascicularis, 144, 145
hispidus, 145
ocreatus, 15
trifoliatus, 144
unguiculatus, 142
vicinalis, 145
Ribes
amictum, 35
aridum, 35
cruentum, 35
Rosa
Arkansana, 13, 14
blanda, 13
Macounii, 10
manca, 11
melina, 10
pratincola, 13
suffulta, 12
Woodsii, 11
Rudbeckia
amplectens, 177
bicolor, 179, 180
divergens, 177
flava, 179
flexuosa, 180
Floridana, 176
hirta, 175
longipes, 178
sericea, 178
truncata, 177
Rumex
altissimus, 234
confinis, 306
densiflorus, 305
ellipticus, 234
fenestratus, 306
gracilipes, 304
hesperius, 234
occidentalis, 305
polyrrhizus, 305
procerus, 305

Scolopendrium, 107
Senecio
amplectens, 119
anacletus, 307
Bigelowii, 117, 118
blitoides, 123
candidissimus, 110
canus, 111
carthamoides, 122
cernuus, 118
chloranthus, 118
cognatus, 114
compactus, 226
crocatus, 114
densus, 226
dimorphophyllus, 109
Fendleri, 112
flavulus, 108
Fremontii, 122
Howellii, 111
Holmii, 120
imbricatus, 117
invenustus, 124
lactucinus, 121
Laramiensis, 111
microdontus, 307
milleflorus, 116
mutabilis, 113
occidentalis, 122
ovinus, 110
Palmeri, 111
petræus, 110, 116
petrocallis, 116
petrophilus, 116
pudicus, 118
Purshianus, 111
Rusbyi, 118
scalaris, 108
scopulinus, 117
seridophyllus, 121
Soldanella, 119
taraxacoides, 119, 120
Valerianella, 109
Wardii, 116
Senecio—*Continued.*
werneriæfolius, 110
Sieversia and Clematis, 50
Sieversia and Pulsatilla, 48
Sieversia
anemonoides, 49
ciliata, 50
glacialis, 48
pentapetala, 48
Rossii, 48
rotundifolia, 50
sericea, 50
triflora, 50
turbinata, 50
Silphium
collinum, 44
compositum, 44
helianthoides, 43
incisum, 45
Simpsonii, 44
trifoliatum, 43
Sisyrinchium
bellum, 34
Bermudiana, 33
demissum, 34
halophilum, 34
Langloisii, 32
littorale, 33
montanum, 33
xerophyllum, 32
Solidago
aureola, 236
bellidifolia, 100
Californica, 70
Canadensis, 70
nana, 70
pruinosa, 70
Sorbus
Californica, 131
dumosa, 129
occidentalis, 131
scopulina, 130

Sorbus—*Continued.*
subvestita, 130
Streptanthus arcuatus, 192
Swertia
occidentalis, 184
ovalifolia, 185
perennis, 184
scopulina, 184
Taraxacum
ammophilum, 233
angustifolium, 232
ceratophorum, 231
Chamissonis, 228
dumetorum, 230
erythrospermum, 227, 233
lacerum, 230
latilobum, 231
mutilum, 232
officinale, 227
ovinum, 229
Thalictrum **fissum**, 233
Thelypodium
affine, 314
crenatum, 20
integrifolium, 20, 314
rhomboideum, 314
simplex, 200
Thermopsis **pinetorum**, 138
Thysanocarpus
affinis, 311
filipes, 200
Townsendia **Bakeri**, 157
Treleasea pumila, 225
Trifolium
anemophilum, 137
attenuatum, 137
dasyphyllum, 137, 138
lilacinum, 307
nemorale, 136
petræum, 307
Vanclevea stylosa, 51
Verbena
bracteosa, 152
confinis, 152
nodiflora, 46
rudis, 152
Vesicaria alpina, 309
Viola
Albertina, 288
alsophila, 7
amœna, 7
Andersonii, 287
arvensis, 9
bellidifolia, 292
bicolor, 9
blanda, 5, 6
canina, 285
cardaminefolia, 289
clandestina, 8
cognata, 7
communis, 140
compacta, 286
conjugens, 3
crenulata, 295
cyclophylla, 7
desertorum, 291
Dicksonii, 65
elegantula, 66
emarginata, 142
falcata, 3
filipes, 289
fimbriatula, 139
Fletcheri, 296
fulcrata, 285
Illinoensis, 293
insignis, 9
Labradorica, 290
lætecærulea, 297
Missouriensis, 141
Mistassinica, 5
monticola, 307
nodosa, 296
oreocallis, 288
oreophila, 307

Viola—*Continued.*
ovata, 139
palustris, 296
papilionacea, 140
petrophila, 286
pratincola, 64
Rafinesquei, 9
retroscabra, 290
retusa, 7
rotundifolia, 8
sarmentosa, 8
sempervirens, 8
septemloba, 9
septentrionalis, 294
subcordata, 286
subsinuata, 5
subviscosa, 293
tenella, 9
tricolor, 9
unguiculata, 291
vagula, 67
venustula, 295
vicinalis, 9
Watsonii, 5

Vittaria
elongata, 106
ensiformis, 106
filiformis, 106
isoetifolia, 106
lineata, 106

Vittaria—*Continued.*
zosteræfolia, 106

Walter, author of nomina seminuda, 263

Xamacrista, 26

Xanthium, species by Rafinesque and by Wallroth, 59

Xanthium
acerosum, 63
acutum, 62
affine, 60
Californicum, 62
campestre, 61
Canadense, 59, 61, 62
glanduliferum, 61
macrocarpum, 59
orientale, 58
palustre, 63
silphiifolium, 60
strumarium, 58
varians, 59

Zapania
cuneifolia, 47
lanceolata, 47
nodiflora, 47

Zebrina pumila, 225

Zygadenus
gracilentus, 241
longus, 240

ERRATA.

Page 43, line 20, for when, read where.
" 160, " 7, for nearly, read merely.
" 161, " 17, for Waksatch, read Wahsatch.
" 167, " 14, for less., read Less.